ACUTE KIDNEY INJURY IN SNAKEBITE PATIENTS AND ITS CLINICAL PREDICTORS

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CERTIFICATE FROM THE DEAN

This is to certify that this dissertation entitled**"ACUTE KIDNEY INJURY IN SNAKEBITE PATIENTS AND ITS CLINICAL PREDICTORS"** is the bonafide work of **Dr.S.SELVARAJ** in partial fulfillment of the university regulations of the Tamil Nadu Dr. M.G.R. Medical University, Chennai, for **M.D General Medicine Branch I** examination to be held in **April 2015.**

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DECLARATION

I **Dr.S.SELVARAJ** declare that, I carried out this work on"**ACUTE KIDNEY INJURY IN SNAKEBITE PATIENTS AND ITS CLINICAL PREDICTORS"** at the Department of Medicine, Govt. Rajaji Hospital during the period APRIL 2014 to August 2014. I also declare that this bonafide work or a part of this work was not submitted by me or any others for any award, degree or diploma to any other University, Board either in India or abroad.

This is submitted to The Tamilnadu Dr.M.G.R.Medical University, Chennai in partial fulfillment of the rules and regulations for the M.D degree examination in General Medicine

Place : Madurai

DATE

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ABBREVIATIONS

APTT	Activated Partial Thromboplastin Time
ASV	Anti Snake Venom
Bl. Urea	Blood Urea
CKD	Chronic Kidney Disease
eGFR	Estimated glomerular filtration rate
FFP	Fresh Frozen Plasma
IVE	Intravenous Fluid
Sr. Creatinine	Serum Creatinine
TC	Total count
WBCT	Whole Blood Clotting Time

CONTENTS

INTRODUCTION

In many parts of India, snake is worshipped and in some areas special prayers are performed. In Northern India on Naga Panjami day people worship snake idol. In certain areas of Maharashtra and Goa the live snakes, rarely live cobras are brought for worship. Snake charmers carry snakes especially cobra, door to door for worship. At every house the snake's mouth is forced open and some milk is poured down in its throat though milk is not snake food. It is also believed that snakes bite people who harmed them in their previous birth. When snakes are killed, people offer special prayers and bury them. People also believe that snakes take revenge against those who harmed them.

In view of their strong beliefs and many associated myths, people resort to magico-religious treatment for snake bite thus causing delay in seeking proper treatment. As a result, valuable time is lost in some of the deserving cases. It is poignant to note that some of the cinema and TV serial stories even now propagate non-scientific ideas on snakes and snakebites, and display traditional treatment. Hence, there is a need for the health department to disseminate the scientific aspects related to snakebites to the community.

AIMS AND OBJECTIVES

1. To study the clinical profile of renal involvement in snake bite patients
2. To study the in-hospital outcome of acute kidney injury in snake bite patients

REVIEW OF LITERATURE

Magnitude of the problem:-

Recently global burden of snake bite was assessed using available published data and modeling technique. From that it is estimated that 4,21,000 envenomations and 20,000 deaths occur annually. These figures may be as high as 18,41,000 envenomations and 94,000 deaths.

Snake bites contribute to health problem in India and continue to be a major medical concern. India alone contributes to 81,000 envenomations and 11,000 deaths annually. Based on the above statistics, it appears that every 10 seconds one individual is envenomed and one among four dies due to snake bite. Many deaths occur before the victim reaches the hospital.

Actually up-to-date national data, on the morbidity and mortality due to snakebite is not available. Moreover there is no national snake bite registry in India. So the available statistics is incomplete and not systematically collected.

In 1972, Dr. Sawai and Dr. Homma of the japan Snake Institute studied snake bite in about 10 hospitals in India. They reported that about 10% of snake bite deaths are among the victims who come to the hospital and about 90% die outside, having gone for other remedies like mantra, magic, and so on. However things are very different now, after 35 years.

Government Rajaji Hospital, Madurai from June to Oct 2014 has treated 281 Cases of snake bites. Among them, there were 182 males and 99 females. 94 were referred after treatment in different hospitals and 187 were brought to the hospital directly. 274(97.5%) survived and 7 died due to various complications, number referred, number who received supportive Theraphy and death are provided below (Table no.1).

Table No.1: Statistics on clinical aspects of snake bites and outcome

Type of snake	Number treated	Local signs	Neuro Toxicity	Hemo-Toxicity	Supportive			Number Expired
					Mechanical ventilation	Hemo-Dialysis	Fasciotomy	
Cobra	118	80	118	-	90	-	-	2
Krait	82	-	51	82	60	3	-	2
Russell's Viper	42	42	-	42	6	23	1	1
Hump-nosed Viper	4	4	-	4	-	4	-	1
Saw scaled viper	16	16	-	16	-	3	-	1

Sea Snake	3	3	-	-	-	-	-	-
Non poisonous	16	6	-	-	-	-	-	-

An equal or more numbers of snake bite cases were admitted and treated at other Government Medical College Hospitals. Patients go to private hospitals mostly for first aid purposes. Very few get adequate treatment in these hospitals.

The Government is spending a huge sum of money in procuring and supplying anti snake venom. On an average, Government hospitals spend a minimum of Rs.5,000/- per case of Snake bite and patient spend an equal amount for socio-cultural and magico-religious aspects. The money lost due to loss of job and earning as well as loss of lives is huge, and thus has an impact on the national economy. Deaths due to snake bite can be prevented, if some simple first aid measures are undertaken by the public and / or by the health care providers. So, there is an urgent need to take effective steps to contain these issues.

Many of the first aid measures carried out at present are ineffective and dangerous. The research also concluded that the other traditional methods followed for snake bite are not appropriate. It is gratifying to note that the traditional snake catchers in Tamil Nadu, the Irulas with their own sophisticated herbal medicine system, have now understood the problems? They know that the snake injects venom which goes deep into the system and this can be neutralized only by injection of Anti snake venom (ASV) and not by oral or locally applied remedies, no matter how famous. But this information needs to reach other communities also.

Hence, the need to recommend the most effective first aid to the victims bitten by snakes and to recommend effective steps in the management of this problem. Poisoning due to cobra and viper groups are seen frequently in the state of Tamil Nadu. Very rarely Sea snake bite cases are reported. Hence, this hand book focuses on the first two. Though the specific antidote is not available for sea snake, the same general principles for other snake bites are applicable here too.

Epidemiology of snakebite:-

Snakebite is observed all over the country with a rural / urban ratio of 9:1. They are more common during monsoon and post monsoon seasons. Snakebites are seen often among agricultural workers and among those going to the forest. Many of the susceptible populations are poor living below poverty line, living in rural areas with less access to health care.

The male / female ratio among the victims is approximately 3:2. Majority are young and their age is between 25 to 44 years. Most of the bites (90 to 95%) are noticed on the extremities (limbs). The hospital stay varies from 2 to 30 days, with the median being 4 days. The in-hospital mortality varies from 5 to 10%, and the causes are acute renal failure, respiratory failure, sepsis, bleeding and others.

Ecological aspects:

By destroying forests for creating agricultural land, the prey base of the snake (that is frogs and rats) has increased. The rice fields, which harbor millions of rats attract a lot of snakes. The number of snakes per acre in a rice field is abnormally high when compared to the natural population in the forest. Humans go into the field every morning and come out in the evening, just the time when snakes are active. Thus, the chance of an encounter between farmer and snake is very high. As more areas are inhabited at the periphery of towns, even there the chances of human / snake interaction increase.

Cobras flourish as long as there are rice fields; there they feed mainly on the mole rat (varapu eli in Tamil), live and lay their eggs in the rat burrow networks. Kraits also get by very well in rice fields because they like the plentiful small rodents such as the field mouse (sundeli in Tamil) and rock mouse (Kallu eli in Tamil). Kraits are also found in the mounds of earth and rubble near wells.

The Russell's viper lives in the rocky outcrops and hedgerows of cactus and other bushes which often form the boundaries of

agricultural land. There, on the high ground, they have a plentiful supply of common gerbil (Velleli in Tamil) which are also attracted to the wealth of food humans provide by their farming activities! But thanks to snakes, we are not overrun by rodents.

Classification of Snakes:-

There are more than 3000 spices of snakes in the world. For the purpose of clinical practice, snakes are classified into poisonous (venomous) and non-poisonous (nonvenomous) snakes. Poisonous snake are classified into three families and they are

- Cobra group [Elapidae]
- Viper group [Viperidae]
- Sea snake group [Hydrophidae]

For many decades, the concept of the “Big 4” snakes of medical importance has reflected the view that 4 spices and responsible for Indian snakebite mortality. They are the Indian Cobra (Naja naja), the comman Krait (Bungarus caeruleus), the Russell’s viper (Daboia russelii) and the Saw scaled viper (Echis carinatus). However, recently another species, the Hump-nosed pit viper (Hypnale hypnale), has been found to be capable of causing lethal envenomation, and that this

problem had been concealed by systematic misidentification of this species as the saw-scaled viper.

The concept of the “Big 4” snakes has failed to include all currently known snakes of medical significance in India. This has a negative effects on clinical management of snakebite and the development of effective snake anti venoms.

Table No.2: Categorisation of snakes (W.H.O. 1981)

Class	Details	Name of the snakes
I	Commonly cause death or serious disability	Russell’s viper / Cobra / Saw scaled viper
II	Uncommonly cause bites but are recorded to cause serious effects (death or local necrosis)	Krait / Hump-nosed pit viper / King cobra / Mountain pit viper
III	Commonly cause bites but serious effects are very uncommon.	Water snakes, Green snakes

DIFFERENT TYPES OF SNAKES

Snakes of Medical Importance in Tamil Nadu – Distinguishing features:-

A great deal is written concerning the problem of how to identify medically significant species from non-significant ones. A large amount of space is devoted, in both medical and toxicology textbooks, to the problem of how to identify venomous snakes. The problem with this information is that it is complex (involves counting of scales) and not definitive (the identification of pre or post maxillary teeth) and of no use to a doctor in a medical situation. On the question of description, it is worth remembering that the least reliable means of identifying a particular species of snake is to use color.

Virtually every species of venomous snake has a huge range of color manifestations and even the markings can be subjected to major variations. What is important therefore is to focus on the key aspects of identification that enable the medical professional to rapidly identify whether they are dealing with a venomous species, and what that species might be.

Russell's viper (Daboia russelii):-

The Russell's viper is a stout bodied snake, the largest of which grows to approximately 1.8 meters in length. Like all vipers it is a nocturnal snake, but unfortunately for humans, during the daytime it rests up under bushes, at the base of trees and in leaf litter. It is therefore frequently encountered by rural workers, as they are carrying out general agricultural activities.

There are two key identification features that are worth nothing. The first is a series of chain –like or black edged almond shaped marks along the snakes back and flanks. The second distinguishing mark is a white triangular mark on the head with the apex of the triangle pointing towards the nostrils.

Saw scaled Viper:-

The southern Indian Saw Scaled Viper is a small snake, usually between 30 and 40 centimeters long. The Northern Indian species (Echis sochureki) is much larger, with an average size of 60 centimeters. It in habits mainly dry arid climates but can also be found in scrub land.

One of the key identification features of this species is the posture it adopts when it is agitated. It moves its body into a figure of

eight like arrangements with its head at the center. It rapidly moves its coils against each other and produces a hissing like sound which gives its name of ‘Saw scaled’ in addition, there are often wavy hoop like markings down both sides of the saw scales body. On the head, there is usually a white or cream arrow shaped mark, pointing towards the front of the head, often compared to the shape of the birds foot.

The Hump-Nosed Pit Viper (Hypnale hypnale):-

The hump nosed pit viper is one of India’s tiniest venomous snakes, its total length ranging from 28.5 to 55cm. Its distinctive features include the presence of five large symmetrical plate scales on the top of the head in addition to the smaller scales typical of all vipers. There are heat sensitive pits between the nostril and the eye.

Spectacled Cobra (Naja naja):-

The spectacle Cobra, is probably India’s most well recognized snake. The hood markings of the spectacle like mark, distinguishes this snake from other species, and its habit of rearing up when alarmed makes it distinctive but not definitive as other species do this, notably the Trinket snake. The cobras coloration may vary from pale yellow to black.

Common Krait (Bungarus caeruleus):-

The Common krait is a nocturnal snake which usually grows to approximately 1.0 to 1.2 meters in length. Its primary diet is other snakes. It can be found all over peninsular India and often seeks habitation near human dwellings. During the day it rest up in piles of bricks, rat burrows or other buildings. The common krait is the most poisonous snake in India and its venom is pre-synaptic neurotoxic in nature.

There are number of key identifiers which are worth remembering. The krait is black, sometimes with the bluish tinge, with a white belly. Its markings consist of paired white bands which may be less distinct anteriorly. These paired white bands distinguish the snake from another black nocturnal snake, The Common wolf snake. The wolf snake's white bands usually are thicker and are singular bands equidistant from each other. The useful distinguishing feature is a series of hexagonal scales along the top of the snakes back. This feature is really useful if the dead snake has been brought to the hospital and examined.

King Cobra:-

The King Cobra is the least medically significant of the venomous snakes in India in terms of both bites and fatalities. Hence, descriptive features of this are not provided here.

Clinical aspects of Snake Bite:-

Snake venom is mostly watery in nature. It consists of numerous enzymes, proteins, amino acids, etc., Some of the enzymes are proteases, collagenase, arginine ester hydrolase, hyaluronidase, phospholipidase, metallo-proteinases, endogenases, autocoids, thrombogenic enzymes, etc., These enzymes also act like toxins on different tissues of the body, and are grouped under neurotoxins, nephrotoxins, hemotoxins, cardiotoxins, cytotoxins etc., resulting in organ dysfunction / destruction. Enormous clinical and experimental works have been published on the pathophysiology of snake bite in relation to different species of snakes

Hyaluronidase allows rapid spread of venom through subcutaneous tissues by disrupting mucopolysaccharides, and

phospholipase A2 has esterolytic effect on the red blood cell membrane and causes hemolysis. It also promotes muscle necrosis.

Thrombogenic enzymes promote formation of weak fibrin clot, which activities plasmin and results in consumptive coagulopathy and hemorrhagic consequences. Venom of some snakes causes neuromuscular blockade at pre or post synaptic level.

In addition to above it causes endothelial cell damage which results in increased vascular permeability. In short, snake venom acts on various parts / systems / organs of the body. Venom also causes endothelial cell damage which results in increased permeability.

Symptoms and signs:-

An international expert on snakebite, the late Dr. Alistair Reid of the Liverpool School of Tropical Medicine found out that only 10 to 15% of venomous bites end in death. The possibility of survival, even without treatment, is incredibly good in 80-90% of cases. One of the reasons for this is that much snakebite are by non-venomous snakes. Secondly, a large percentage of venomous snakebites are dry bites i.e., the snake does not always inject venom. Sometimes, it might inject only a tiny quantity of venom.

The snake can inject the quantity of venom it wants. This is an entirely voluntary process. Hence, one can never know how much venom was injected except by observing the progression of the symptoms. In other words the recovery in snakebite without even treatment is great. Every traditional healer uses this fact to his / her advantage and propagates his /her own method to treat snakebite viz., herbal details, “snakestone” or mantra, or plain soda water and most villagers would be happy to go to him.

Also, everyone should remember the systemic action of venom and the extent varies from one snake to another. Complications and outcome due to snakebite may also vary from each other and can’t be predicted by any means.

Moreover, the status of poisoning cannot be judged by the bite mark, reaction to envenomation, size or the type of snake. Hence, one has to observe for signs and symptoms which may develop within 24 to 48 hours. The symptoms and signs of Viperine and Elapid envenomation as well late-onset envenomation are listed below.

General symptoms and signs of Viperine envenomation:-

Local effects

Swelling and local pain with or without erythema or discoloration at the site if bite.

- Tender enlargement of local lymphnodes as large molecular weight Viper venom molecules enter the system via the lymphatics.
- Effects due to coagulopathy and hemorrhagic consequences
- Bleeding from the gingival sulci and other orifices.
- Epistaxis.
- The skin and mucous membranes may show evidence of petechiae, purpura and ecchymoses.
- The passing of reddish or dark-brown urine or declining or no urine output.
- Lateralising neurological symptoms and asymmetrical pupils may be indicative of intra-cranial bleeding.
- Vomiting.
- Acute abdominal tenderness which may suggest gastro-intestinal or retro peritoneal bleeding.
- Hypotension resulting from hypovolaemia or direct vasodilation.
- Low back pain, indicative of early renal failure or retroperitoneal bleeding.

Other effects:-

- Muscle pain indicating rhabdomyolysis.
- Parotid swelling, conjunctival oedema, sub-conjunctival haemorrhage.
- General symptoms and signs of Elapid envenomation:-

Local effects:-

- Swelling and local pain with or without erythema or discoloration at the site if bite.(Cobra).
- Local necrosis and / or blistering / (Cobra).

Neurotoxic effects

- Descending paralysis, initially of muscles innervated by the cranial nerves, commencing with ptosis, diplopia, or ophthalmoplegia. The patient complains of difficulty in focusing and the eyelids feel heavy. There may be some involvement of the senses of taste and smell.
- Problems of vision, breathing and speech.
- Paralysis of jaw and tongue may lead to upper airway obstruction and aspiration of pooled secretions because of the patient's inability to swallow.

- Numbness around the lips and mouth, progressing to pooling of secretions, bulbar paralysis and respiratory failure.
- Hypoxia due to inadequate ventilation can cause cyanosis, altered sensorium and coma. This is a life threatening situation and needs urgent intervention.
- Paradoxical respiration, as a result of the intercostal muscles paralysis is a frequent sign.
- Krait bites often present in early morning with paralysis that can be mistaken for a stroke. Stomach pain which may suggest submucosal haemorrhages in the stomach.

Other effects

- Stomach pain which may suggest submucosal haemorrhages in the stomach (Krait).
- Eye pain and damage due to ejection of venom into the eyes by spitting cobra(as observer in Africa)
- [If failure of renal failure are noted search for others causes / mechanisms]

Late-onset envenomation:-

The patient should be kept under close observation for at least 24 hours. Many species, particularly the Krait and the Hump-nosed pit viper are kown for the length of time it can take for symptoms to manifest. Often this can take between 6 to 12 hours. Late onset envenoming is a well-documented occurrence. This is also particularly pertinent at the start of the rainy season when generally give birth to their young. Juvenile snakes(young ones), 8-10 inches long, tend to bite the victim lower down on the foot in the hard tissue area, and thus any signs of envenomation can take much longer to appear.

Overlapping symptoms and signs:-

Russell's viper envenomation can also manifest with neurotoxic features. This can sometimes cause confusion and further work is necessary to establish how wide this might be. Development of neurotoxic features in Russell's viper bite are believes to be pre synaptic or Krait like in nature. It is for this reason that a doubt is expressed over the response of both species to Neostigmine. Clinical aspects and therapeutic response in relation to some of the poisonous snake in India is provided in Table no. 3

Table No.3: snakes, clinical aspects and therapeutic response

Feature	Cobras	Kraits	Russell's Viper	Saw Scaled Viper	Hump Nosed Viper
Local pain/Tissue Damage	YES	NO	YES	YES	YES
Ptosis / Neurological Signs	YES	YES	YES!	NO	NO
Haemostatic abnormalities	NO*	NO!	YES	YES	YES
Renal Complications	NO	NO*	YES	NO*	YES
Response to Neostigmine	YES	NO?	NO?	NOT applicable	NOT applicable
Response to ASV	YES	YES	YES	YES	NO

Sea snakes:-

Sea snake bites are reported rarely among fishermen and / or their family members living in the seashore area as well as among those who walk on the seashore. To begin with there may be local pain which may be insignificant which appears within 60 to 90 minutes. There may not be obvious local swelling. Systemic manifestations noticed among poisonous sea snake bite are neurological involvement,

severe muscle pain, rightly, renal failure, hyperkalemia and finally cardiac arrest.

Criteria for diagnosis:-

Table No. 4: Details of local envenomation

- Pain-pain at the site of bite, swelling and regional lymphnode
- Oozing - sero / sanguinous oozing from the site of bite
- Node- development of an enlarged tender lymphnode draining the bitten limb
- Discoloration- discoloration at the site of bite
- Swelling – swelling is seen at the site of the bites on the digits (toes and especially fingers); local swelling develops in more than half of the bitten limb immediately(in the absence of the tourniquet) and swelling extends rapidly beyond the site of bite (eg. beyond the wrist or ankle within a few hours of bites on the hands or feet)

Complications and Outcome:

Complications in snake envenomation are due to the hetrogenous composition of the venom. In addition the quantity and quality of the venom and the response of the individual to the components of venom influence the clinical course, complications and outcome. The complications of venom are observed in various systems viz., the

hematological, vascular, renal, respiratory, cardiovascular, endocrine, gastrointestinal muscular and dermatological system.

In addition to the anti-snake venom, the envenomed individual requires supportive treatment for the complications arising out of snakebite as well as the consequences of the complication. One must also remember to look for complications developing after infusion of Inj. anti snake venom and get prepared to treat them also.

The outcome of snakebite depends upon amount of envenomation, bite to needle time, individual's response to envenomation, the complications that develop following snakebite and response to treatment. Till the patient has recovered, one cannot predict the complications and outcome.

Investigations:-

Table No. 5: 20 Minutes Whole Blood Clotting Test (20WBCT)

Advantages	Requirements	Procedure
The most reliable test of coagulation. Can be carried out, at	Dry glass test tube(clean and new) 2ml disposable	Wash hands with soap and water. Wear the gloves

the bedside. Does not require specialized training.	syringe Cotton Antiseptic solution Clean gloves(one pair) (The test tube must not have been washed with detergent, as this will inhibit the contact element of the clotting mechanism)	Collect 2ml blood from the peripheral vein of the unaffected limb Remove the needle and pour the blood along the walls of the test tube Keep the test tube untouched and unshaken in a safe place near the patient's bedside at ambient temperature for 20 minutes Note the time After 20 minutes the test tube is gently tilted and if the blood is still liquid then the

		patient has incoagulable blood.

If the 20WBCT is normal in a suspected case of poisonous snakebites, the test should be carried out every 30 minutes from admission for three and then hourly after that. If incoagulable blood is discovered, the 6 hourly cycles will then be adopted to test for the requirement of repeat doses of ASV. This is due to the inability of the liver to replace clotting factors under 6 hrs.

Other Useful Tests:

Clinical test:

- PP /BP/ RR / Postural Blood Pressure

Laboratory studies:

- Haemoglobin /PCV / Platelet Count / PT / APTT/FDP/D-Dimer
- Peripheral Smear/ Blood grouping/ Rh typing
- Urine Tests for Proteinuria/RBC/Haemoglobinuria/Myoglobinuria
- Biochemistry for Serum Creatinine/Urea / Electrolytes / Oxygen Saturation

Imaging studies:

- X-Ray Chest /CT / Ultrasound(whenever required)

Others:

- Electrocardiogram
- Special investigations depending upon clinical status
- Ocular fundus examination

Treatment:

First aid for snake bite

The first aid currently recommended is based around the mnemonic ‘R.I.G.H.T’.

The details are provided in Table no.6.

Table No.6: Currently recommended First aid

R.=Reassure the patient (70% of all snakebites are from non-venomous species. Only 50% of bites by venomous species actually envenomate the patient) I=Immobilise in the same way as a fractural limb. (Use bandage or cloth to hold the splints, not to block the blood supply or apply pressure. Do not apply any compression in the form of tight ligatures, they don't work and can be dangerous!) G.H.=Get to Hospital Immediately. (Traditional remedies have NO PROVEN benefit in training snakebite). T=Tell the doctor of any systemic symptoms such at ptosis that manifest on the way to hospital.

This method will get the victim to the hospital quickly, without recourse to traditional medical approaches which can delay effective treatment.

Traditional first aid methods followed for snakebite:

The traditional methods such as application of tourniquet, cutting (incision) and suction, washing the wound, snake stone or other methods have adverse effects and hence, they have to be discarded. The mneumonic used to recall some of the traditional methods followed is “WHISTTLE” and these are described below.

Washing the Wound:

Victims and bystanders have a tendency to wash the wound to remove any venom on the surface. This should not be done as the action washing increases the flow of venom into system by stimulating the lymphatic system.

Household remedies:

Various forms of household remedies are applied to the site of bite which may enhance absorption of venom.

(Incision)Cutting and Suction:

Cutting the site of bite and suctioning incoagulable blood increases the risk of bleeding to death as well as increases the risk of infection. Venom is not cleared or removed from the snakebite by this method.

Snake stone:

Snake stone is applied to the site of bite saying that it will absorb the venom and falls once the venom is absorbed. This contributes to delay in seeking appropriate health care.

Tourniquets:

Tight tourniquets made of rope, string and cloth, have been followed traditionally to stop venom flow into the body following snakebite. The problems noticed with tourniquets are:-

- Risk of ischemia and loss of the limb
- Risk of necrosis
- Risk of massive neurotoxic blockade
- Risk of embolism if used in viper bites
- Release of tourniquet may lead to hypotension
- Gives patient a sense of false security, which encourages them to delay their journey to hospital

Treatment:-

- While dealing with a case of snake bite consider the mnemonic ‘RASI’

- Remember principles(“12 As”)
- Address the problems – clinical and social
- Seek help from others when required and
- Inform the patient and/or case givers on the status of illness, clinical course, management, outcome, welfare measures and follow up clearly with empathy.

Principles involved in the management of snake bite:-

The principles while managing cases of snake bite at any Health Centre are clubbed under “12 As”

Table No.7: Principles involved in the management

1. Admit the victim immediately
2. Ask effectively
3. Assess quickly
4. Act swiftly
5. Administer medication meticulously.
6. Address to the wound properly
7. Anticipate complications keenly
8. Avoid errors carefully
9. Ascertain the status repeatedly
10. Amicable with patients and care givers and show empathy
11. Advise on follow up accordingly

Pharmacological aspects of Anti snake venom:-

The goals of pharmacotherapy with injection Anti snake venom (ASV) are to neutralise the venom, reduce morbidity and mortality, and prevent complications. Currently available Anti Venom (ASV) in India polyvalent i.e., it is effective against all the four common species; Russell's viper (Daboia russilii,) common Cobra (Naja naja), Common Krait (Bungarus caeruleus) and Saw Scaled Viper (Echis carinatus). Indian ASV is a F (ab)2 product derived from horse serum and has a half-life of over 90 hours. Though it is purified, it still can be immunogenic.

At present, no monovalent ASV is available primarily because there are no objective means of identifying the snake species, in the absence of the dead snake. Moreover it is difficult for the physician to determine which type of Monovalent ASV to employ in treating the patient. In addition there are difficulties to prepare, supply and maintain adequate stock of species monovalent ASV.

There are other known species such as the Hump-nosed pit viper (Hypnale hynale) where polyvalent ASV is known to be ineffective.

In India ASV is manufactured by Bengal Chemicals & Pharmaceuticals, Kolkata; Bharat Serums, Mumbai; Biological Events, Hyderabad; Central ResearchInstitute, Kausali; Haffkins Pharmaceuticals, Mumbai; King Institute of preventive medicine, Chennai; Pune and Vins bio-products, Hyderabad.

ASV Administration:-

Criteria

ASV is prepared from animal and hence, it should only be administered when there are definite signs of envenomation. Anti-Snake Venom carries risks of anaphylactic reactions and should not therefore be used unnecessarily. Unbound, free flowing venom, can only be neutralized when it is in the bloodstream or tissue fluid. Also it is a scarce and costly commodity. Hence, ASV may be administered only if a patient develops one or more of the following signs/ symptoms.

Systemic envenoming:-

Evidence of coagulopathy primarily detected by 20 WBCT or visible spontaneous systemic bleeding, bleeding gums, etc., Further laboratory tests for thrombocytopenia, HB abnormalities, PCV,

peripheral smear etc may provide confirmation, but 20 WBCT is paramount.

- Evidence of neurotoxicity: ptosis, external ophthalmoplegia, muscle paralysis, inability to lift the head etc.,
- Cardiovascular abnormalities: hypotension, shock, cardiac arrhythmia, abnormal ECG.
- Persistent and severe vomiting or abdominal pain.
- Local envenomation (Refer Table No: 4)

Purely local swelling, even if accompanied by a bite mark from an apparently venomous snake, is not grounds for administering ASV if a tourniquet or tourniquets have been applied. These themselves can cause welling. Once they have been removed for 1 hour and the swelling continues, then it is unlikely to be as a result of the tourniquet and administration of ASV may be justified.

Dosage

The recommended dosage level has been based on published research that Russell's viper injects on average 63mg (SD 7) of venom. Logic suggests that our initial that the majority if victims

should be covered by the initial dose and keeps the cost os ASV to acceptable levels. The range of venom injected is 6mg to147mg.

One vial of ASV neutralizes 6mg of Russell's viper venom. So, to neutralize 63mg of venom, 10 vials are needed. Not all victims will require 10 vials as some may be injected with less than 63mg.

They may also pre-sensitise the patient and thereby create greater risk. For Neurotoxic /Anti Haemmostatic envenomation, 8 to 10 vials of ASV is recommended to be administered as in initial dose. Children receive the same ASV adults, as snakes inject the same amount of venom into adults and children. The ASV targeted at neutralizing the venom.

Administration:-

ASV may be administered in two ways over a period of one hour at a constant speed and the patient should be closely monitored for 2 hours:

Infusion: liquid or reconstituted ASV is diluted in 5-10ml/kg body weight of isotonic saline or glucose and administered as infusion usually.(Fluid requirement for children refer to Annexure II)

Intravenous Injection: Rarely reconstituted or liquid ASV is administered by slow intravenous injection.(2ml/ minute). Each via Iis 10ml of reconstituted ASV.

Facts to be remembered before/ while using of Anti Snake Venom **(ASV):-**

1. ASV is available in a polyvalent form and marketed I liquid or lyophilized preparations in 10ml vial/ampoule.
2. Remember to use and maintain cold coin system for liquid form. Users are informed to ascertain whether the cold chain is maintained.
3. ASV treatment should not be initiated without adequate agents for managing anaphylaxis or anaphylactoid reaction.
4. Anaphylactic or late serum sickness cannot be determined or prevented by test dose.
5. ASV neutralizes the unbound venom, hence give it early.
6. ASV administration should not be delayed or denied on the grounds of anaphylactic reactions to a deserving case.
7. ASV required only to those who show definite signs and symptoms of envenomation.
8. No interaction with ASV has been reported

9. Fetal risk due to ASV has not been established or studied in humans.
10. Safely status for use of ASV during pregnancy has not been established.

ASV Reactions:-

Reactions to ASV develop usually within 15 to 30 minutes or within 2 hours. So monitor the case on ASV at 5min. interval for first 30 min. and then at 15min. interval for two hours. The details of pre hospital treatment and issues related to ASV may be recorded in the form provided in Annexure IV.

Sometimes, anaphylaxis (Type I) following ASV may develop rapidly and deteriorate into a life-threatening emergency, and hence anticipate and observe for it in every case. If the correct guidelines are followed, anaphylaxis can be effectively treated.

Table No. 8: Manifestations if immediate reactions to ASV

Itching(often over the scalp) Urticaria, even a single spot Nausea Vomiting Abdominal colic/pain	Dry cough Bronchospasm /rhonchi Stridor(rarely) Angio-oedea of lips and mucous membrane

Diarrhoea Tachycardia(PR>120/min)(for children refer age specific chart) Fall in blood pressure Low volume pulse	Fever Shaking chills(rigors) Sweating Cold and clammy skin Central cyanosis Febrile convulsions(in children) Anaphylaxis

Treatment for ASV reactions:-

- Discontinue ASV
- Maintain IV line

Administer Inj. Adrenaline 0.5ml of 1:100 IM,(Adults)/Inj. Adrenaline 0.1ml/kg body weight of 1:10,000 IM (paediatric dose).Details are provided in Table No:9

A second dose of 0.5ml of Adrenaline IM is given. This can be repeated for a third and final occasion but in the vast majority of reaction 2 doses of adrenaline will be sufficient

Table No.9: Dosage of adrenaline for adults and children

Adults	***Children (upto 25kg)**
Inject adrenaline 1:1000 intramuscularly: Weighting<50kg give 0.25ml Weighting 50-100kg give 0.50ml Weighting >100kg give 0.75ml	Inject adrenaline 1:1000 dilute Lampoule (1ml) of adrenaline 1:1000 with 9ml water for injection or normal saline. Inject intramuscularly 1:10.000 adrenaline according to the guide (approximates to 0.1ml/kg). 1year(10kg)give 1ml 3year(15kg)give 1.5ml 5year(20kg)give 2ml 8years(25kg)give2.5ml Children>25kg as for small adults

Approximate body weight for children may be calculated by the formula;

2x Age+9=weight in kg

Consider additional measures:-

Administer Salbutamol or Terbutaline by aerosol or nebulizer (Beta 2 agonists) for bronchospasm

Antihistamines: Administer both H1 receptor blockers Inj. Chlorpheniramine maleate 10-20mg as Iv/Intramuscularly or promethazine 0.5-1mg/kg and H2 receptor blockers Inj. Ranitidine 1mg/kg or Famotidine 0.4mg/kg or cimetidine 4mg/kg slowly intravenously.

Administer corticosteroid intravenously: Hydrocortisone 2- 6 mg/kg or Dexamethasone 0.1- 0.4mg/kg.

Try nebulised Adrenaline (5ml of 1:1000) in case of laryngeal oedema which often will ease upper airways obstruction. However, do not delay intubation if upper airways obstruction is progressive.

- IV fluids should be given for haemodyamic instability

Once the patient has recovered, the ASV can be restarted slowly for 10-15 minutes. Keeping the patient under close observation. Then the normal drip rate should be resumed.

Monitor vitals and provide supportive measures

Late Serum sickness reactions (delayed hypersensitivity) to ASV:-

Serum sickness may occur one to two weeks after administration of ASV. Late Serum sickness reactions can be easily treated with an steroid such as prednisolone, adults 5mg 6 hourly, paediatric dose 0.7mg/kg/day.(Duration of treatment has to be adjusted with case). Oral H1 Antithistamines provide additional symptomatic relief.

Prevention of ASV Reactions- Prophylactic Regimens:-

The conclusion in respect of prophylactic regimens to prevent anaphylactic reactions is that there is no evidence from good quality randomized clinical trials to support their routine use. If they are used then the decision must rest on other grounds, such as policy in the case of hospitals, which may opt for a maximum safety policy, irrespective of the lack of definitive trial evidence.

Two prophylactic regimens normally recommended are given below:

100mg of Hydrocortisone and H1 antihistamine (10mg Chlorphenimarine maleate; or 22.5mg IV) Phenimarine maleate IV or 25mg. Promethazine hydrochloride IM) 5minutes before ASV

administration. The dose for children is 0.1-0.3mg/kg of antihistamine IV and 2mg/kg of Hydrocortisone IV.

0.25-0.3mg Adrenaline 1:1000 given gives subcutaneously.

If the victim has a known sensitivity to ASV, pre-medication with adrenaline, hydrocortisone and anti-histamine may be advisable, in order to prevent severe reactions.

OBSERVATION AND RESULTS

Study Design:

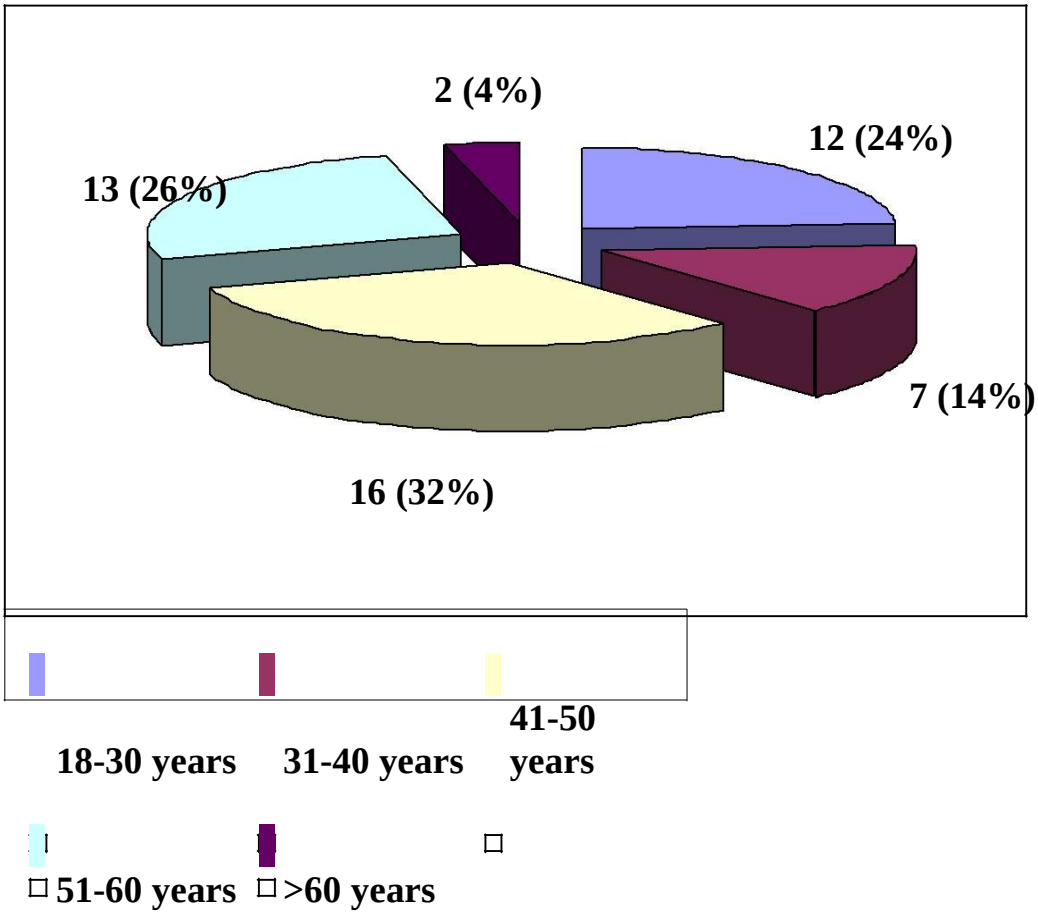
A prospective clinical study with 50 snake bite patients is undertaken to study the acute Kidney Injury

Table 1: Age distribution of patients studied

Age group (years)	Number of patients	%
18-30 years	12	24.0
31-40 years	7	14.0
41-50 years	16	32.0
51-60 years	13	26.0
>60 years	2	4.0
Total	**50**	**100.0**

Mean ± SD: 43.80 ±12.6

Figure 1: Age distribution of patients studied



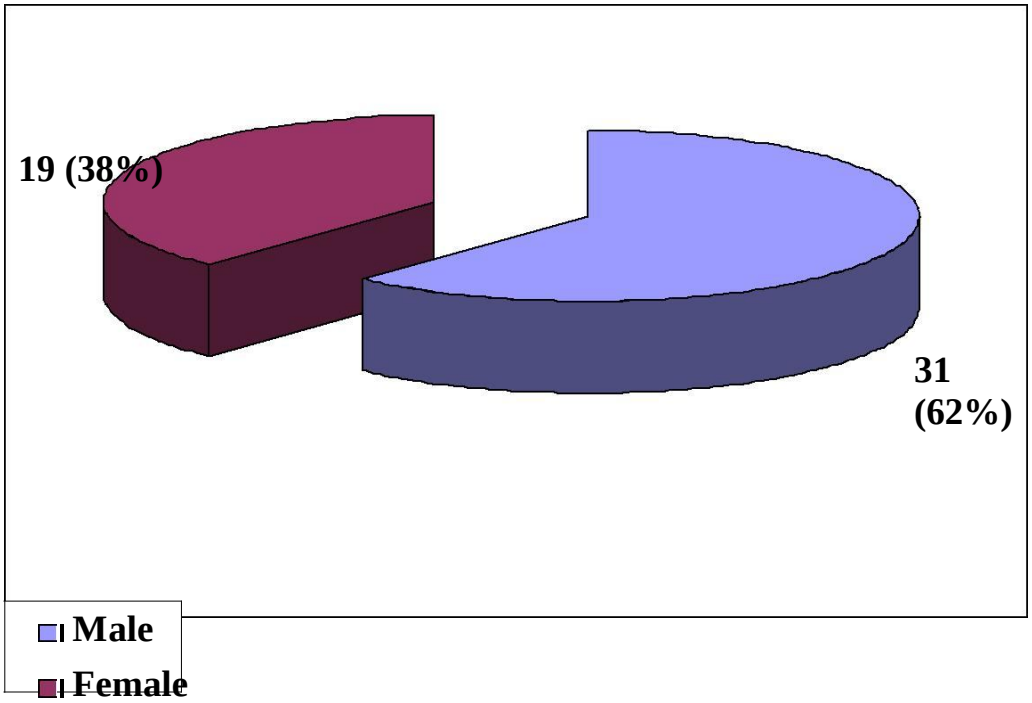
Sixteen patients were in the age group of 41–50 years. Mean age was

43.8 years.

Table 2: Gender distribution of patients studied

Gender	**Number of patients**	**%**
Male	31	62.0
Female	19	38.0
Total	**50**	**100.0**

Figure 2: Gender distribution of patients studied



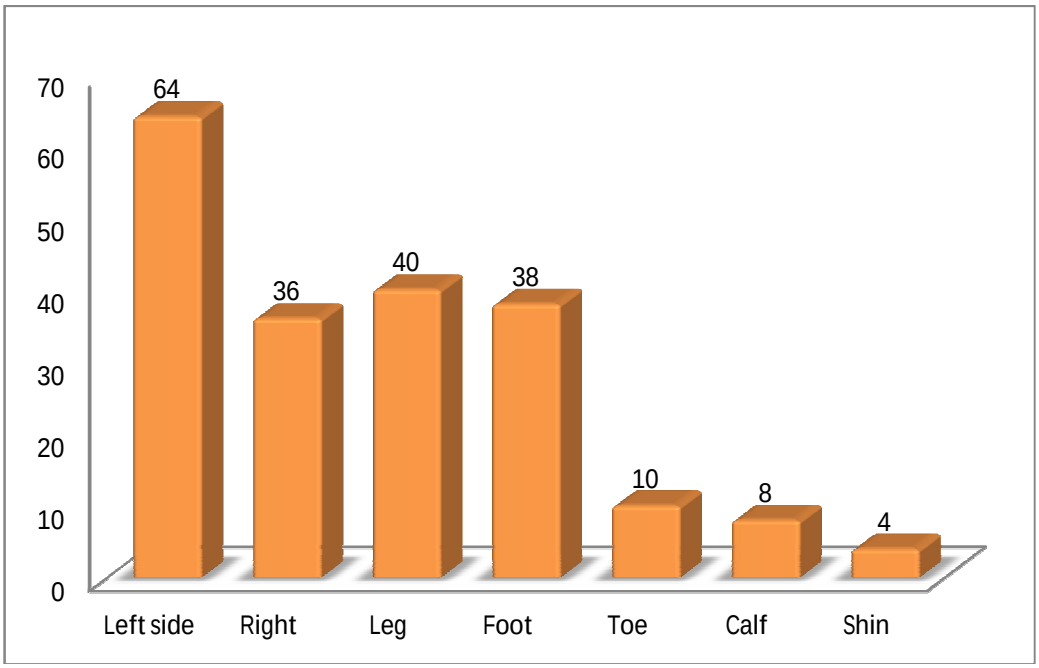
Out of 50 patients included in this study, 31 were males (62%) and

19 (38%) were females.

Table 3: Snake bite site of patients studied

Snake bite site	**Number of patients (n=50)**	**%**
Side of bite		
Left side	32	64.0
Right	18	36.0
Site of bite		
Leg	20	40.0
Foot	19	38.0
Toe	5	10.0
Calf	4	8.0
Shin	2	4.0

Figure 3: Snake bite site of patients studied

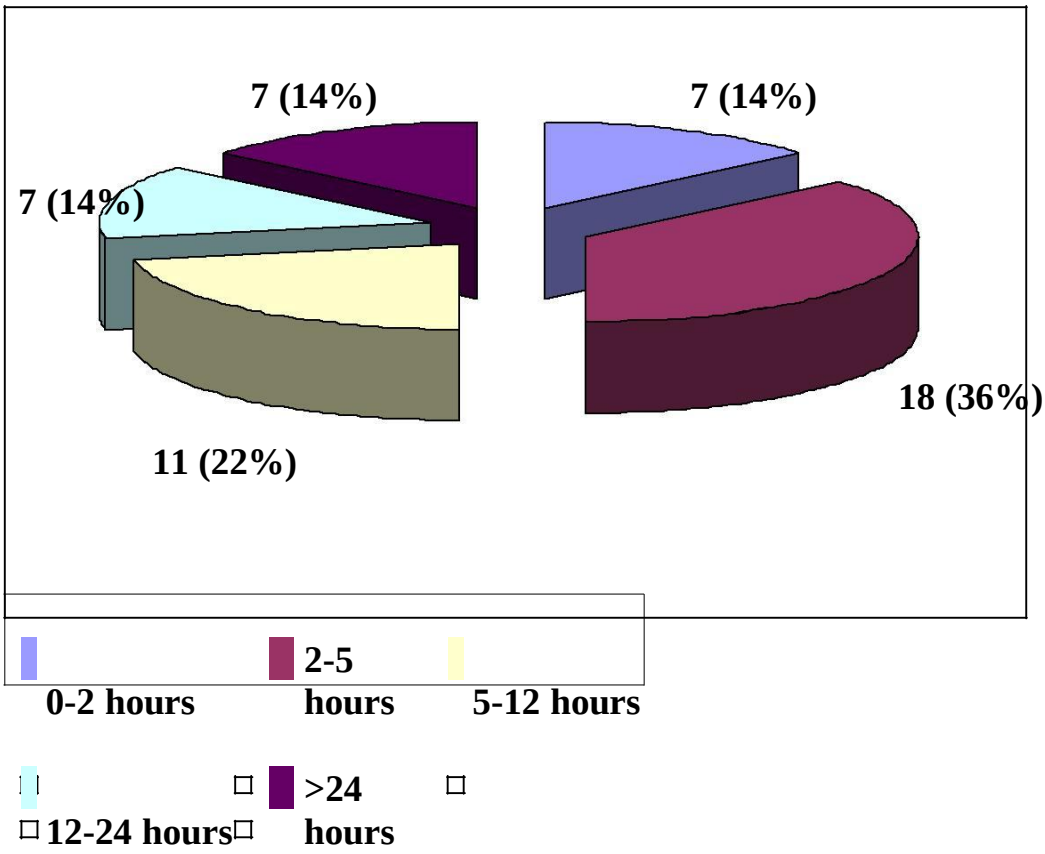


All bites were to the lower limb. 32 patients (64%) of patients had snake bite to left lower limb.

Table 4: Distribution of Lapse of time in hrs of patients studied

Lapse of time in hours	**Number of patients**	**%**
0-2 hours	7	14.0
2-5 hours	18	36.0
5-12 hours	11	22.0
12-24 hours	7	14.0
>24 hours	7	14.0
Total	**50**	**100.0**

Figure 4: **Distribution of Lapse of time in hrs of patients studied**



18 (36%) patients presented to the hospital within 2-5 hours of snake bite.

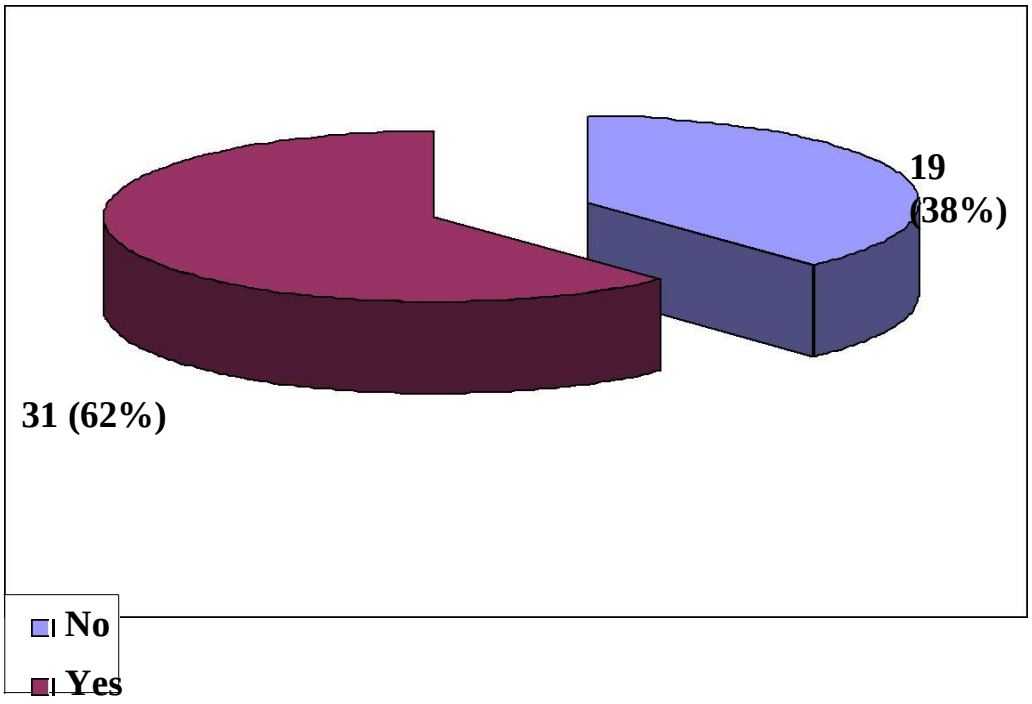
Only 7 patients presented after 24 hours of snake bite to the hospital.

Table 5: Distribution of Tourniquet application

of patients studied

Tourniquet application	Number of patients	%
No	19	38.0
Yes	31	62.0
Total	50	100.0

Figure 5: Distribution of Tourniquet application of patients studied

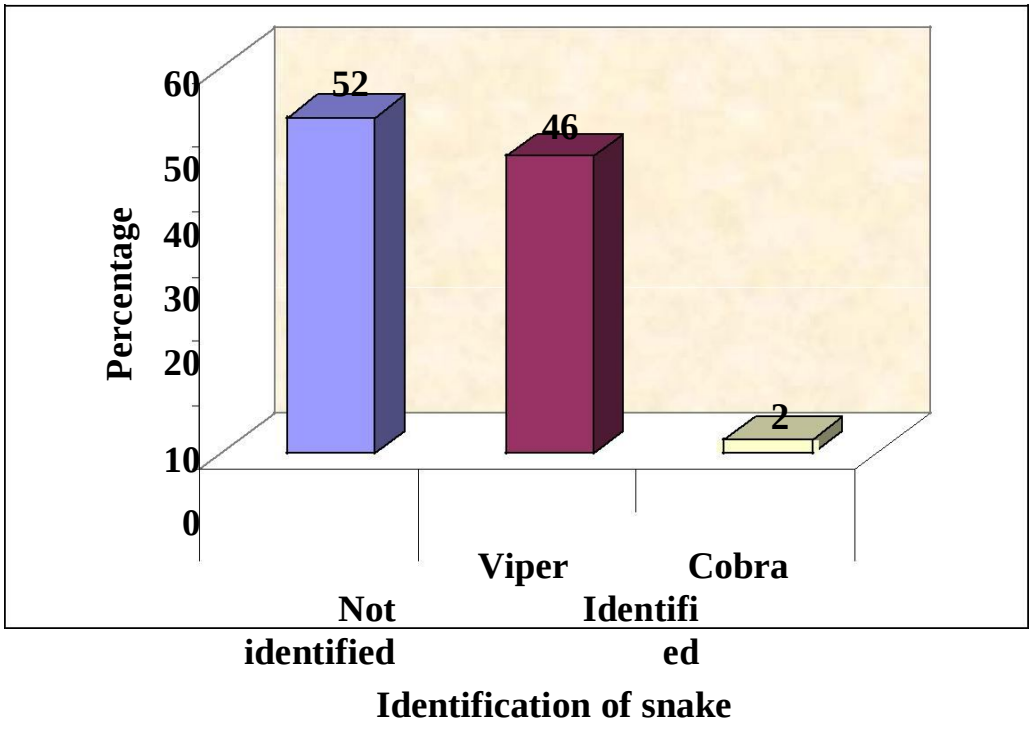


62% had applied tourniquet before coming to the hospital

Table 6: Identification of snake of patients studied

Identification of snake	**Number of patients**	**%**
Not identified	26	52.0
Identified		
Viper	23	46.0
Cobra	1	2.0
Total	**50**	**100.0**

Figure 6: Identification of snake of patients studied



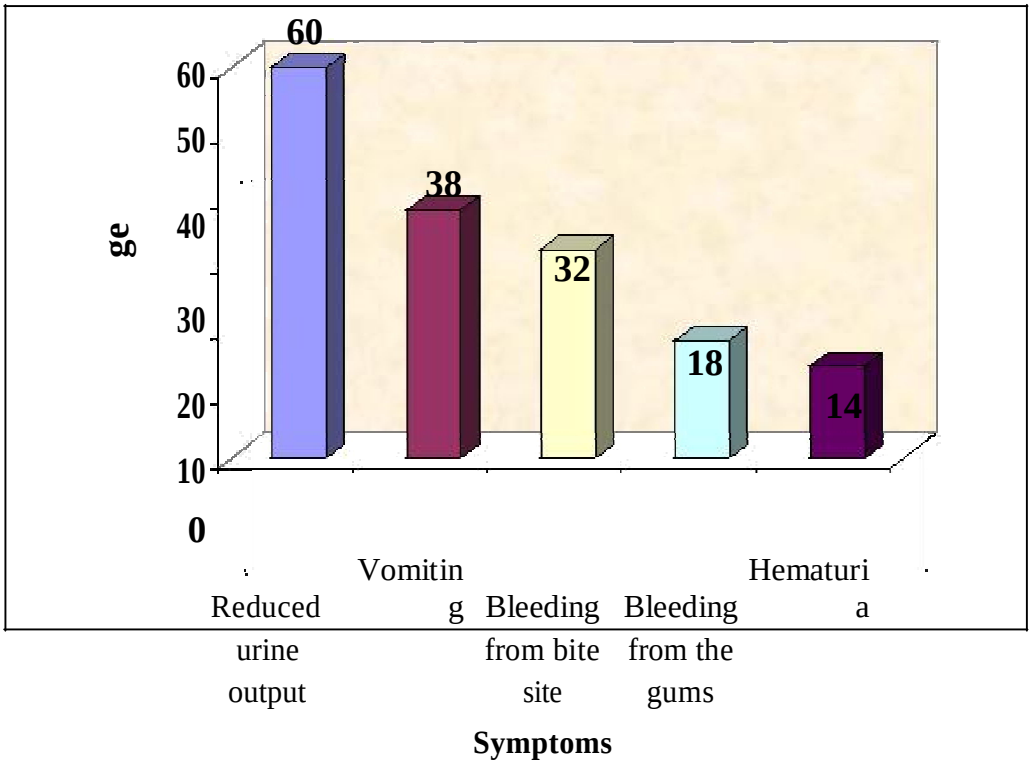
Among 50 snake bites, only 24 (48%) had identified the snake as viper

bites in 23 cases and cobra bite in 1 case.

Table 7: Symptoms of snake bite patients

Symptoms	Number of patients (n=50)	%
Reduced urine output	30	60.0
Vomiting	19	38.0
Bleeding from bite site	16	32.0
Bleeding from the gums	9	18.0
Hematuria	7	14.0

Figure 7: Symptoms of snake bite patients

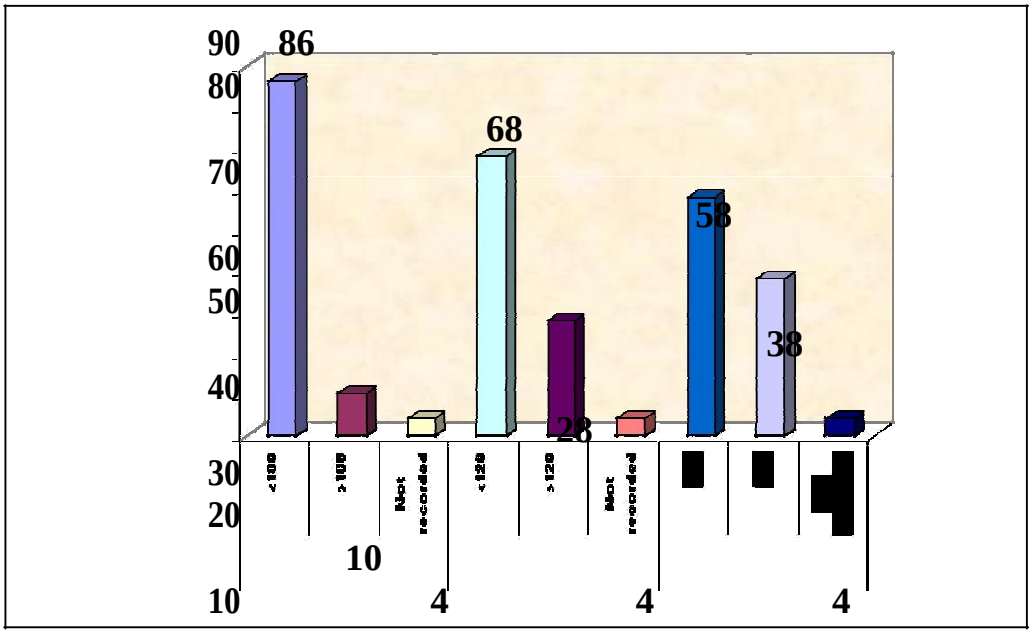


Thirty (60%) patients presented with reduced urine output, 19 patients (38%) with vomiting, 16 (32%) with bleeding from gums and 7 (14%) presented with hematuria.

Table 8: Vital statistics of patients studied

Vital statistics	Number of Patients (n=50)	%
Pulse		
<100	43	86.0
>100	5	10.0
Not recorded	2	4.0
Systolic blood pressure mmHg		
<120	34	68.0
>120	14	28.0
Not recorded	2	4.0
Diastolic blood pressure mmHg		
<80	29	58.0
>80	19	38.0
Not recorded	2	4.0

Figure 8: Vital statistics of patients studied



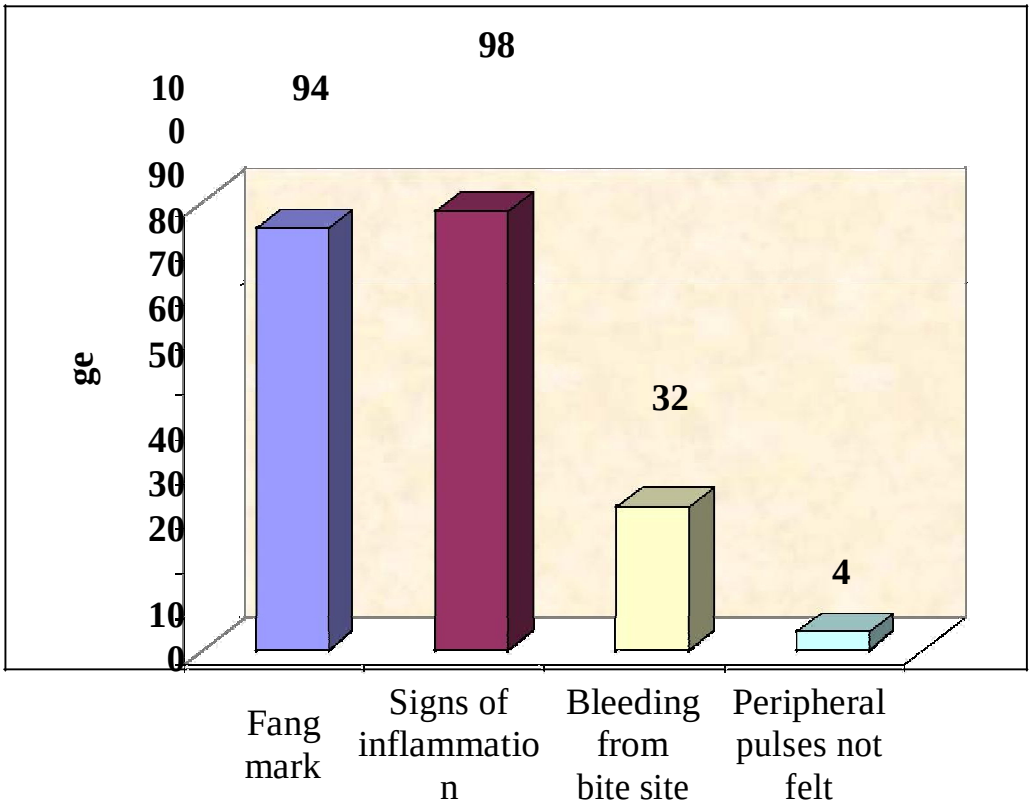
Vital statistics

Five patients (10%) had tachycardia and 2(4%) pulse was not palpable. Systolic blood pressure (SBP) was ≤120 mmHg in 34 (68%) and >120 in 14(28%). Diastolic blood pressure (DBP) was ≤80 mmHg in 29 (58%) and >80 mmHg in 19 (38%). Blood pressure was not recordable in 2 patients.

Table 9: Clinical manifestations

Clinical manifestation	Number of patients (n=50)	%
Fang mark	47	94.0
Signs of inflammation	49	98.0
Bleeding from bite site	16	32.0
Peripheral pulses not felt	2	4.0

Figure 9: Clinical manifestations

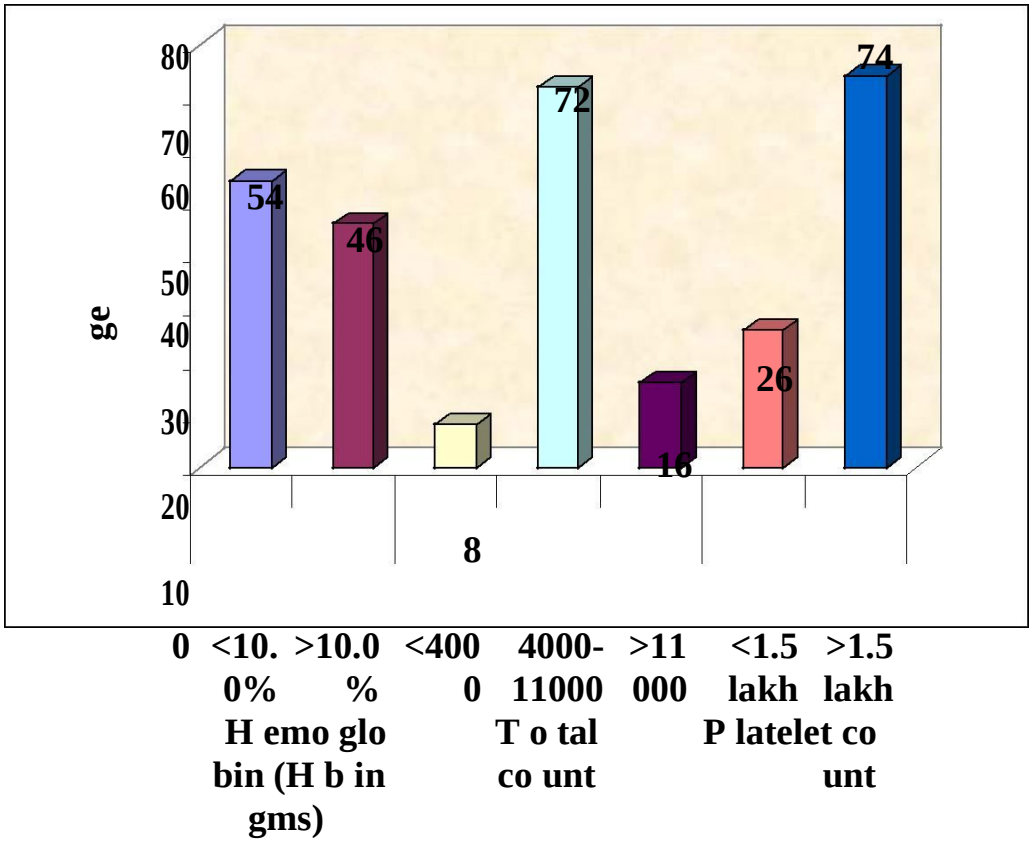


On local examination 49 (98%) had signs of inflammation, 47 (94%) had fang mark, 16 (32%) had bleeding from bite site and in 2 (4%) patients peripheral pulses not felt.

Table 10: Hematological parameters of patients studied

Hematological parameters	Number of Patients (n=50)	%	Mean ± SD
Hemoglobin (Hb in gms)			
<10.0%	27	54.0	9.40±2.08
>10.0%	23	46.0	
Total count			
<4000	4	8.0	8013.00±5214.13
4000-11000	38	72.0	
>11000	8	16.0	
Platelet count			
<1.5 lakh	13	26.0	1.95±0.83
>1.5 lakh	37	74.0	

Figure 10: Hematological parameters of patients studied

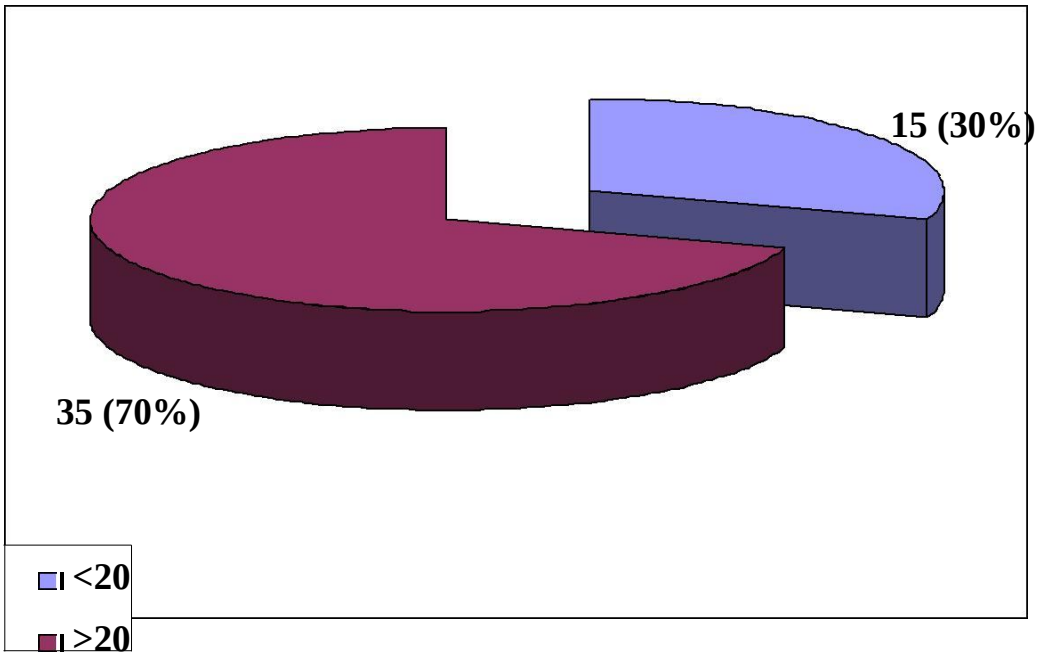


Laboratory data showed anemia with Hb <10 gm% in 27 (54%), Leukocytosis (Total count >11,000) in 8 (16%) and thrombocytopenia (platelet count <1.5 lakh) in 13 (26%) patients.

Table 11: WBCT in minutes of patients studied

WBCT in minutes	Number of patients	%
<20	15	30.0
>20	35	70.0
Total	50	100.0

Figure 11: WBCT in minutes of patients studied

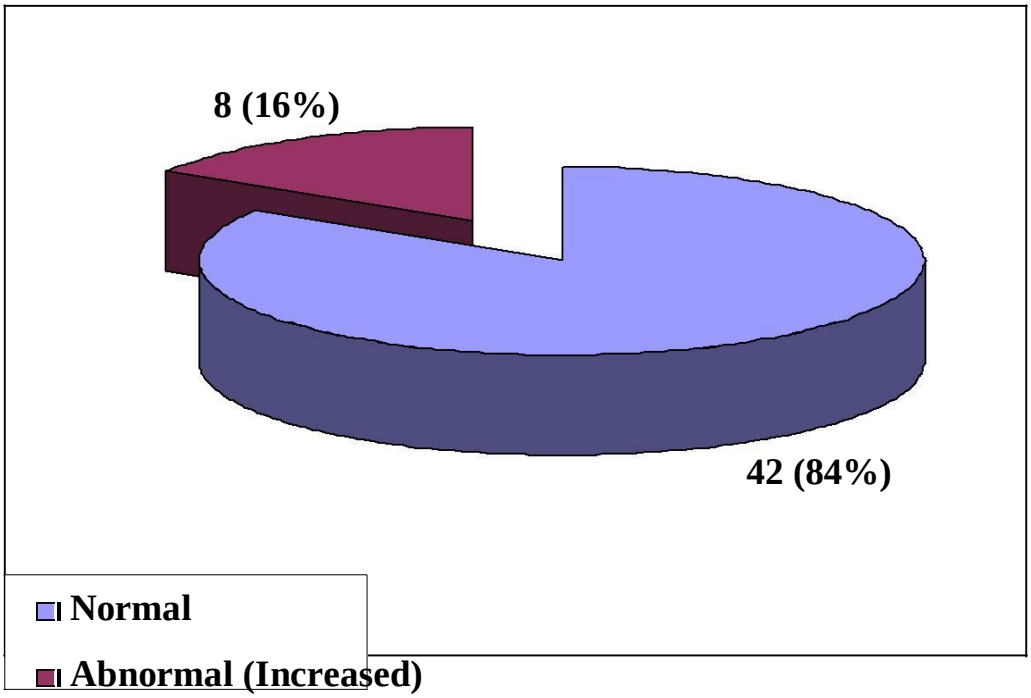


Whole Blood Clotting Time (WBCT) was >20 minutes in 35 (70%) Patients.

Table 12: Bleeding time of patients studied

Bleeding time	Number of patients (n=50)	%
Normal	42	84.0
Abnormal (Increased)	8	16.0
Total	50	100

Figure 12: Bleeding time of patients studied

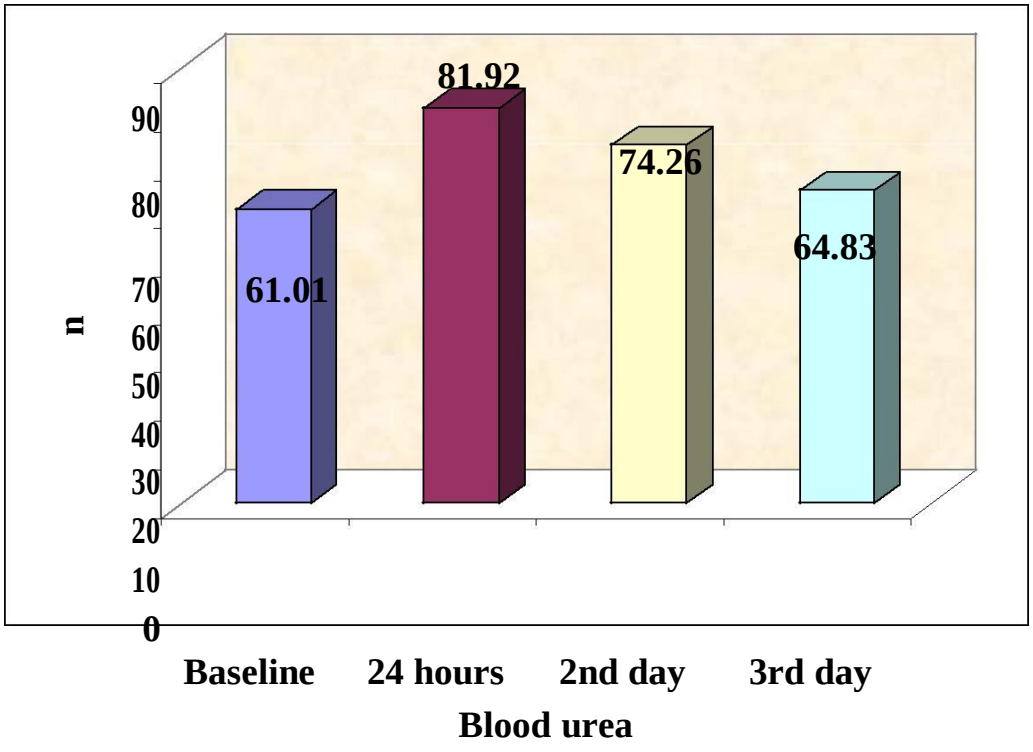


Bleeding time was prolonged in 8 (16%) patients

Table 13: Levels of Blood urea of patients studied

Blood urea	Min – Max	Mean ± SD	P value from baseline
Baseline	15.00-198.00	61.01±39.99	-
24 hours	29.00-192.00	81.92±40.75	<0.001*
2nd day	22.00-188.00	74.26±42.69	0.016
3rd day	17.00-196.00	64.83±41.45	0.668

Figure 13: Levels of Blood urea of patients studied

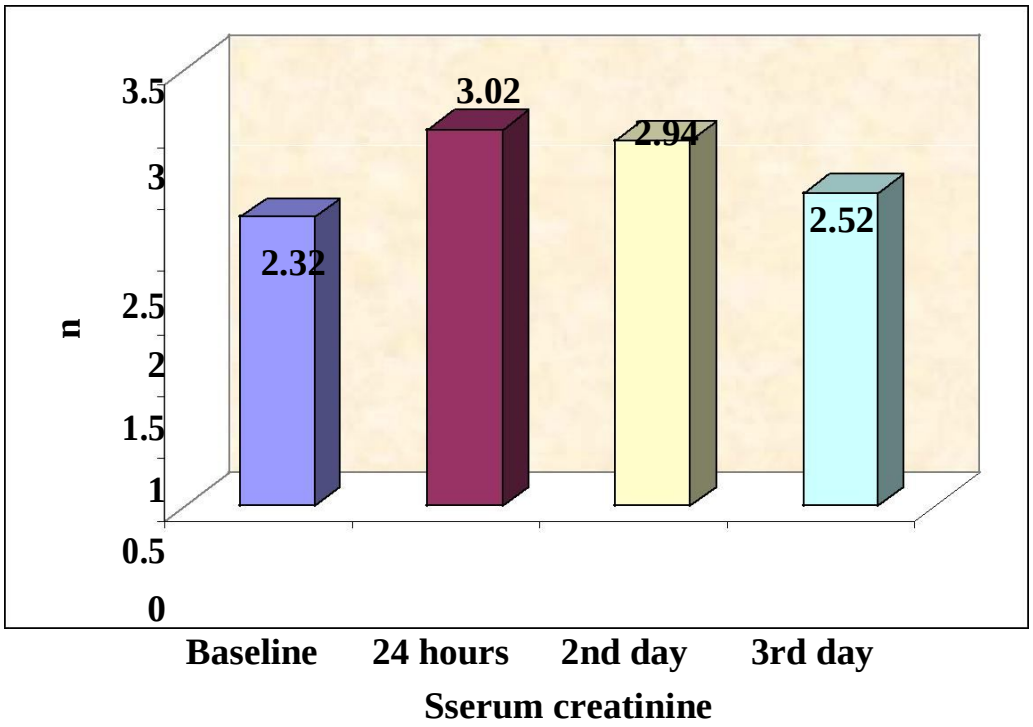


Mean levels of blood urea at baseline, at 24 hours (p value <0.001), on 2nd day and 3rd day were 61.01 mg/dl, 81.92 mg/dl, 74.26 mg/dl and 64.83 mg/dl respectively

Table 14: Levels of Serum creatinine of patients studied

Serum creatinine	Min - Max	Mean ± SD	P-value from baseline
Baseline	0.30-20.00	2.32±3.30	0
24 hours	0.90-21.00	3.02±3.58	<0.001**
2nd day	0.60-21.00	2.94±3.72	0.016
3rd day	0.60-18.00	2.52±3.24	0.472

Figure 14: Levels of Serum creatinine of patients studied

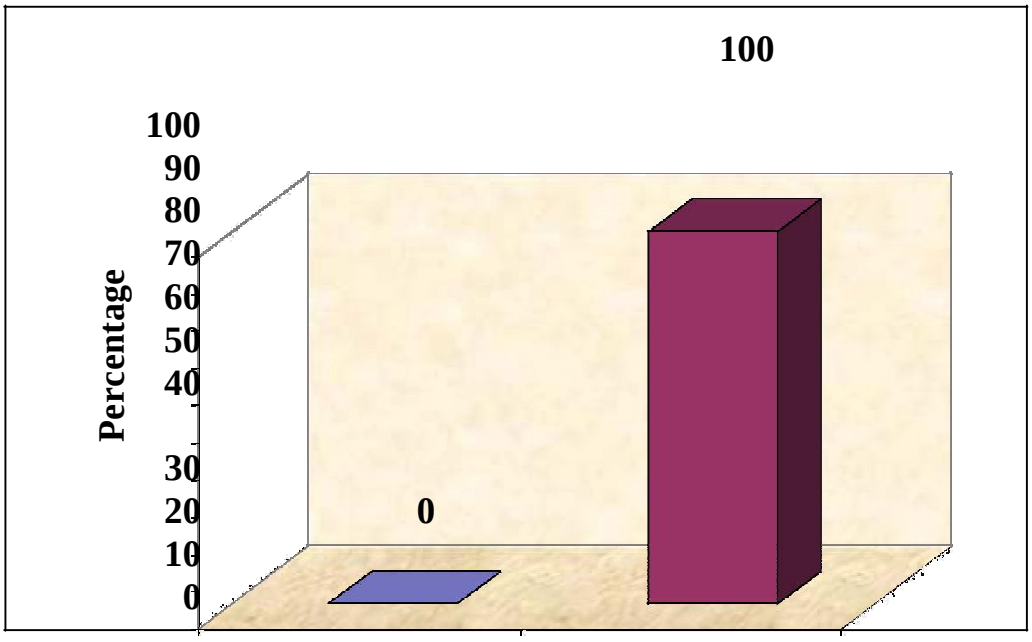


Mean levels Serum Creatinine at baseline, at 24 hours (p-value <0.001), on 2nd day and on 3rd day were 2.32 mg/dl, 3.02 mg/dl, 2.94 mg/dl and 2.52 mg/dl respectively.

Table 15: Creatine kinase of patients studied

Creatine kinase	Number of patients	%
Normal (Male: 25-90 U/L; Female 10-70 U/L)	0	0.0
Raised (Male >90 U/L; Female >70 U/L)	50	100.0
Total	50	100.0

Figure 15: Creatine kinase of patients studied



Normal (Male: 25-90 U/L;	Raised (Male >90 U/L;
Female 10-70 U/L)	Female >70 U/L)

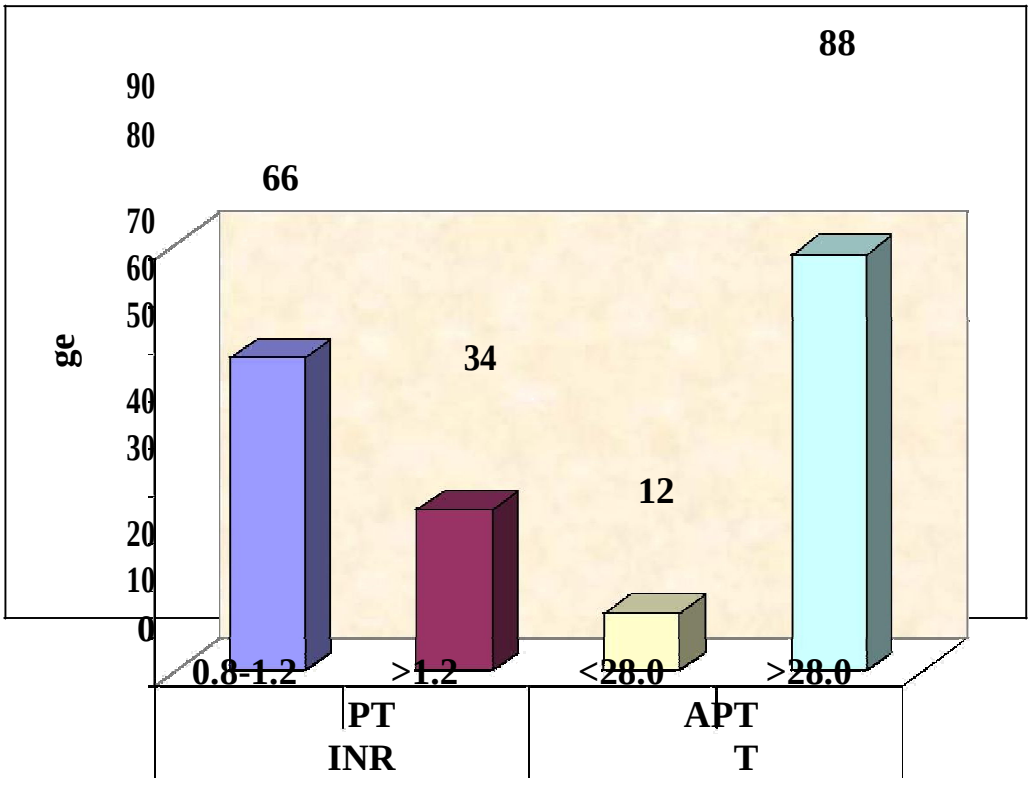
Creatine kinase

All patients included in the study had elevated serum creatinine kinase levels with a mean of 266.58 U/L (Mean ± SD: 266.58±122.53).

Table 16: PT INR and APTT of patients studied

	Number of patients (n=50)	**%**
PT INR		
0.8-1.2	33	66.0
>1.2	17	34.0
APTT		
<28.0	6	12.0
>28.0	44	88.0

Figure 16: PT INR and APTT of patients studied

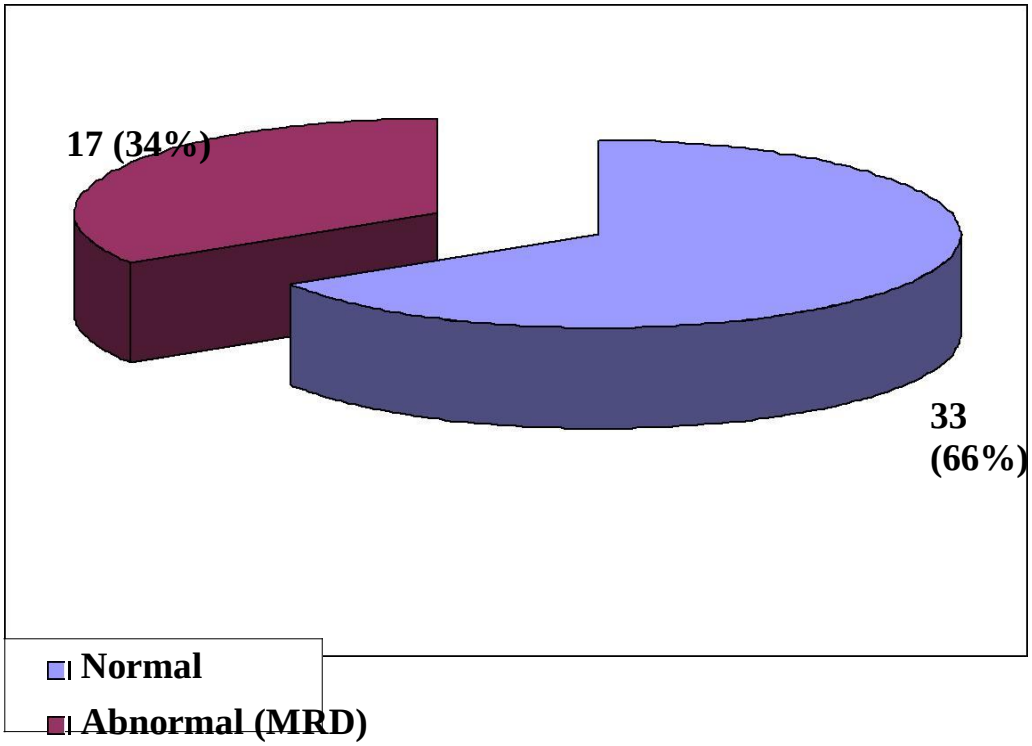


PT-INR was prolonged (>1.2 seconds) in 17 (34%) patients and APTT was prolonged (>28 seconds) in 44 (88%) of patients.

Table 17: USG abdomen of patients studied

USG abdomen	Number of patients (n=50)	%
Normal	33	66.0
Abnormal (MRD)	17	34.0
Total	50	100

Figure 17: USG abdomen of patients studied

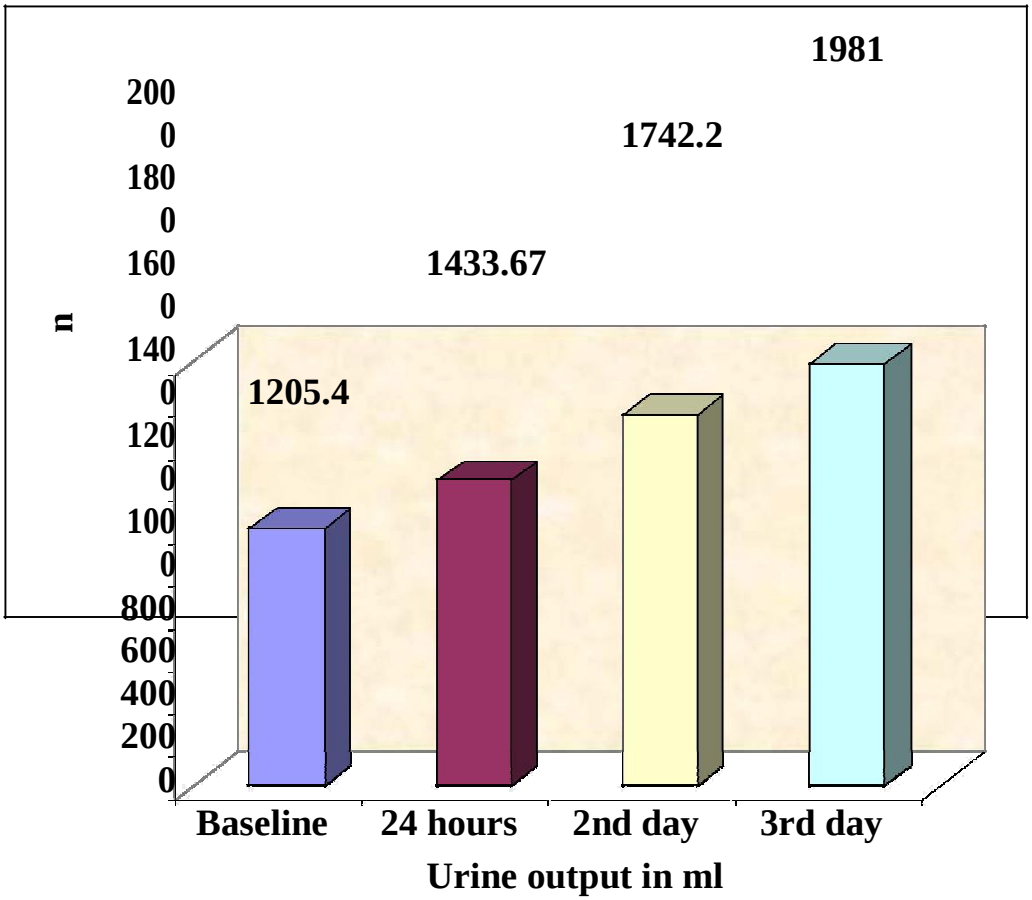


USG abdomen was normal in 33 (66%) patients and was abnormal in 17 (34%) patients showing alteration in cortical echotexture with normal kidney size.

Table 18: Urine output in ml/day of patients studied

Urine output in ml	Min - Max	Mean ± SD	P value from baseline
Baseline	15.00-4000.00	1205.40±1010.72	-
24 hours	50.00-3500.00	1433.67±945.29	<0.001**
2nd day	60.00-3000.00	1742.20±929.42	<0.001**
3rd day	100.00-3500.00	1981.00±874.98	<0.001**

Figure 18: Urine output in ml/day of patients studied

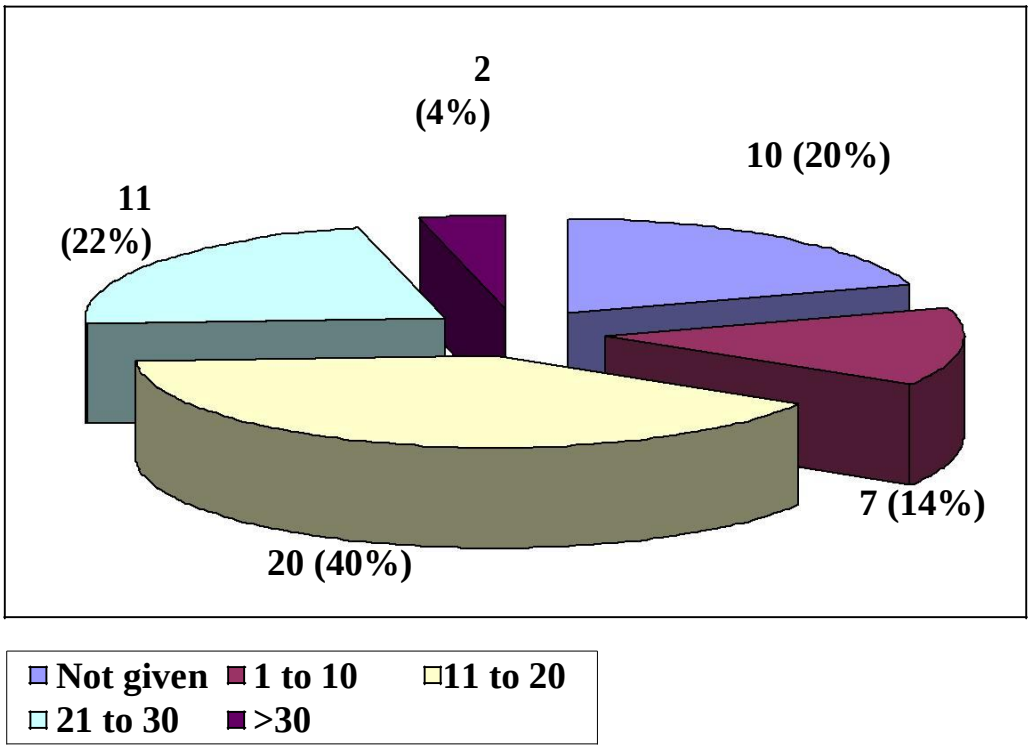


Mean levels of urine output at baseline, at 24 hours, on 2nd day and on 3rd day were 1205.40 ml/day, 1433.67 ml/day, 1742.20 ml/day and 1981 ml/day respectively with significant p value (<0.001).

Table 19: ASV vials given for patients studied

ASV vials given	Number of patients	%
Not given	10	20.0
1 to 10	7	14.0
11 to 20	20	40.0
21 to 30	11	22.0
>30	2	4.0
Total	50	100.0

Figure 19: ASV vials given for patients studied

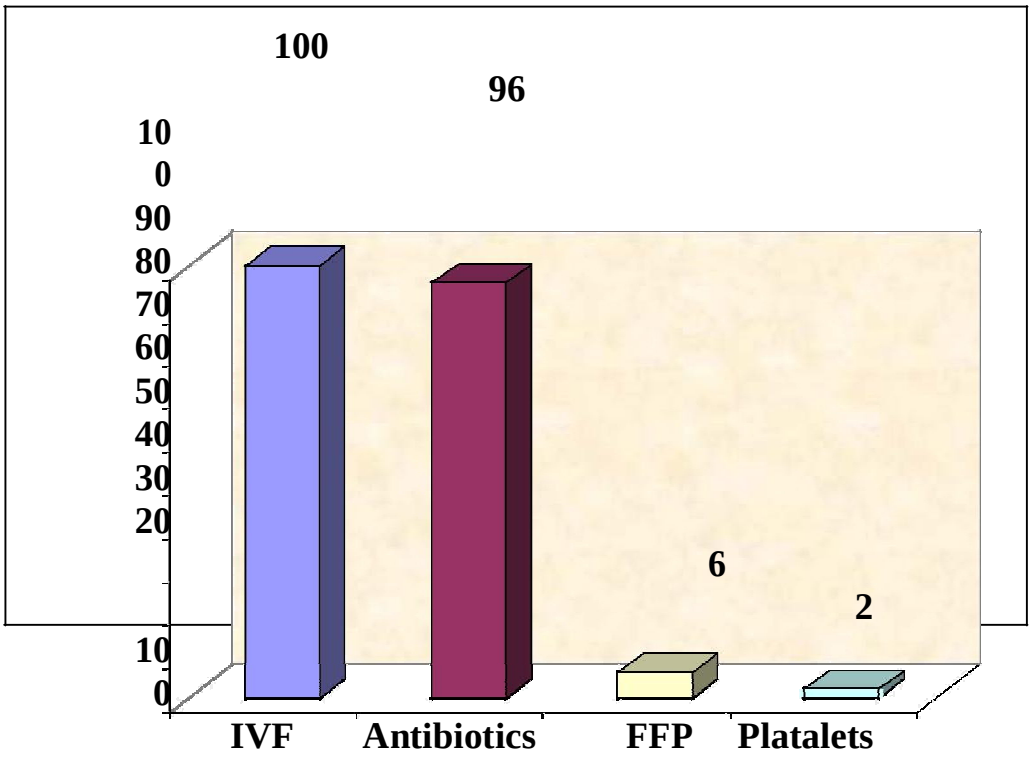


Twenty patients (40%) received 11-20 vials of ASV and ≥30 vials of ASVwere given only for 2 patients.

Table 20: Supportive treatment of patients studied

Supportive treatment	Number of patients (n=50)	%
IVF	50	100.0
Antibiotics	48	96.0
FFP	3	6.0
Platalets	1	2.0
Whole blood	4	8.0

Figure 20: Supportive treatment of patients studied



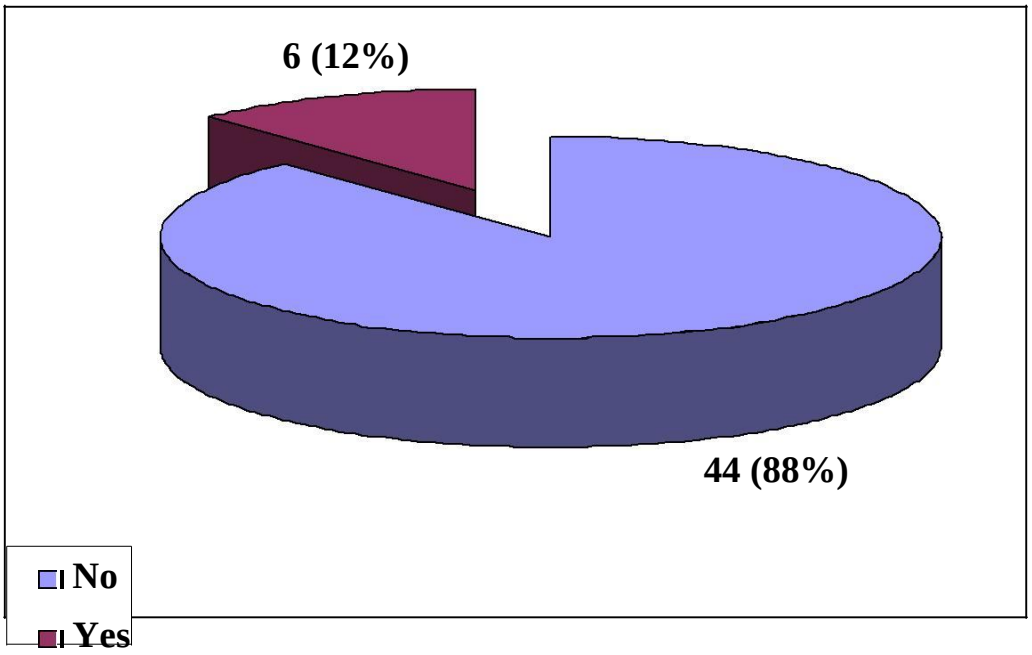
Supportive treatment

All patients received Intravenous fluid (IVF) and 48 patients (96%) received antibiotics as supportive treatment. 7 patients were transfused blood and blood products. 3 patients (6%) were transfused FFP, 4 (8%) were transfused whole blood and one patient received platelets transfusion.

Table 21: Need for hemodialysis of patients studied

Need for hemo dialysis	Number of patients	%
No	44	88.0
Yes	6	12.0
Total	50	100.0

Figure 21: Need for hemodialysis of patients studied

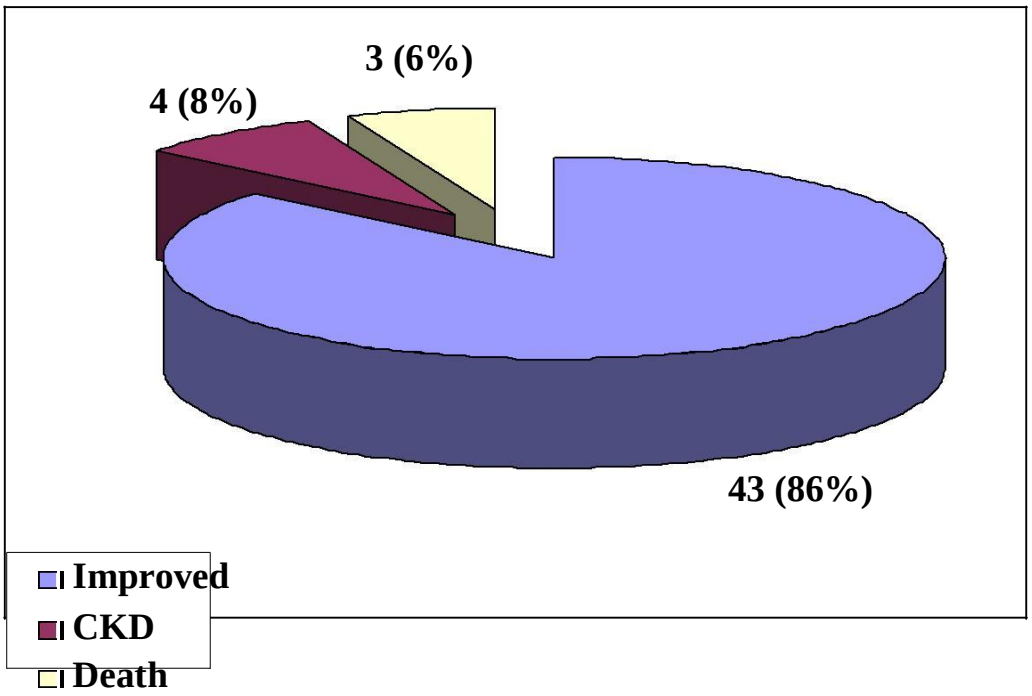


Among 50 patients 6 (12%) required hemodialysis.

Table 22: End results of snake bite patients studied

End results	Number of patients	%
Improved	43	86.0
CKD	4	8.0
Death	3	6.0
Total	50	100.0

Figure 22: End results of snake bite patients studied



Out of 50 patients studied, 43 (86%) improved and 7 had a poor outcome. Among those 7, 4 patients developed Chronic Kidney Disease (CKD) and 3 patients succumb to death.

Table 23: Association of clinical variables according to outcome

Clinical variables	Outcome		P-value
	Good (n=43)	Poor (n=7)	
Age in years			
<40	18(41.9%)	1(14.3%)	0.229
>40	25(58.1%)	6(85.7%)	
Gender			
Male	27(62.8%)	4(57.1%)	1.000
Female	16(37.2%)	3(42.9%)	
Site of bite			
Leg	18(41.9%)	2(28.6%)	0.687
Foot	14(32.6%)	5(71.4%)	0.093+
Toe	5(11.6%)	0(0%)	1.000
Calf	4(9.3%)	0(0%)	1.000
Shin	2(4.7%)	0(0%)	1.000
Lapse time in hrs			
0-2 hours	7(16.3%)	0(0%)	0.005**
2-5 hours	18(41.9%)	0(0%)	
5-12 hours	10(23.3%)	1(14.3%)	
12-24 hours	4(9.3%)	3(42.9%)	
>24 hours	4(9.3%)	3(42.9%)	
Alternative treatment			
No	40(93%)	2(28.6%)	<0.001**
Yes	3(7%)	5(71.4%)	
Identified snake			
Not identified	24(55.8%)	2(28.6%)	0.239
Identified	19(44.2%)	5(71.4%)	
Tourniquet application			
No	16(37.2%)	3(42.9%)	1.000
Yes	27(62.8%)	4(57.1%)	

Comparison between good outcome (recovered from AKI) and poor outcome (not recovered from AKI) shows significant p-value for 'lapse of time in hours' in presenting to the hospital after snake bite (p-value 0.005) and 'alternative treatment taken' before coming to the hospital (p-value 0.001).

Table 24: Association of clinical symptoms according to outcome

Clinical symptoms	Outcome		P value
	Good (n=43)	Poor (n=7)	
Signs of inflammation	42(97.7%)	7(100%)	1.000
Reduced urine output	24(55.8%)	6(85.7%)	0.219
Vomiting	15(34.9%)	4(57.1%)	0.404
Bleeding from bite site	15(34.9%)	1(14.3%)	0.406
Bleeding from the gums	8(18.6%)	1(14.3%)	1.000
Hematuria	5(11.6%)	2(28.6%)	0.250

Figure 23: Association of clinical symptoms according to outcome

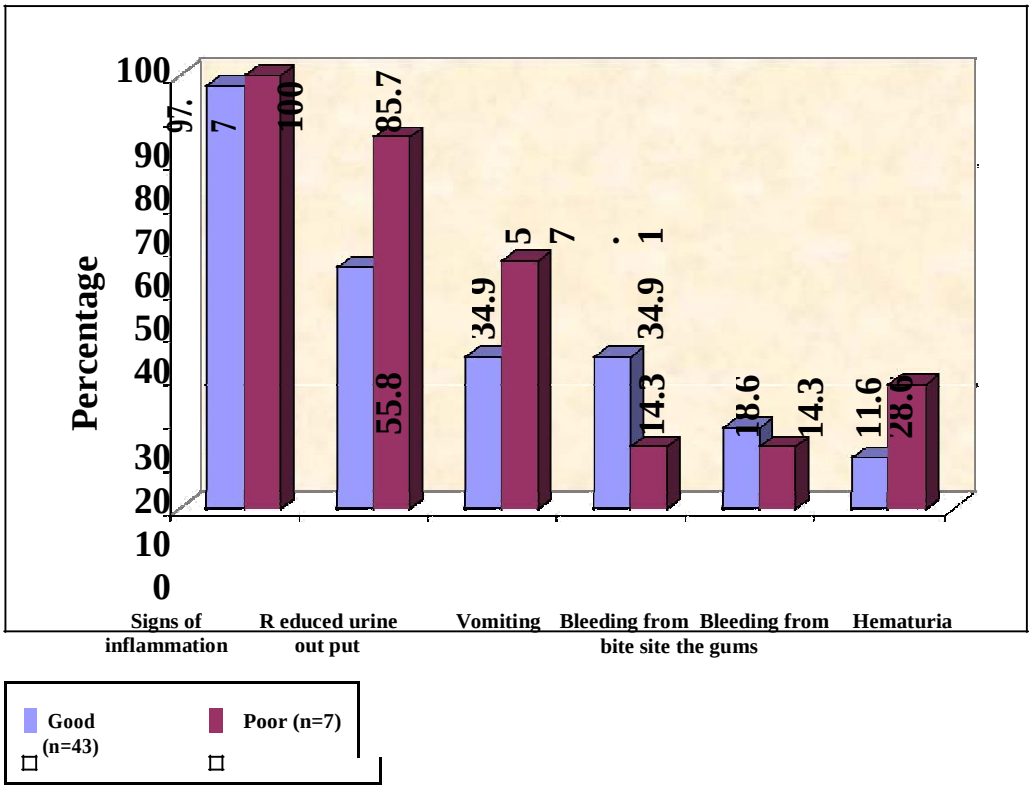
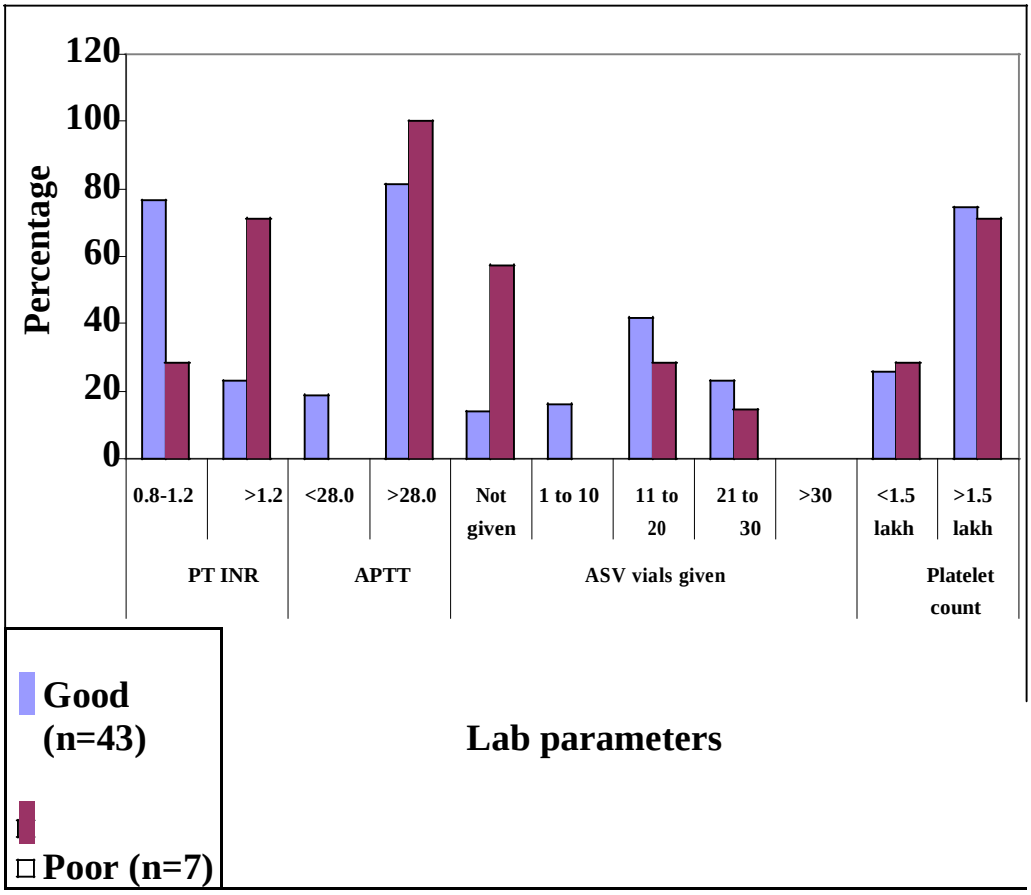


Table 25: Association of Lab parameters according to outcome

Lab parameters	Outcome		P value
	Good (n=43)	Poor (n=7)	
PT INR			
0.8-1.2	33(76.7%)	2(28.6%)	0.020*
>1.2	10(23.3%)	5(71.4%)	
APTT			
<28.0	8(18.6%)	0(0%)	0.580
>28.0	35(81.4%)	7(100%)	
ASV vials given			
Not given	6(14%)	4(57.1%)	0.184
1-10	7(16.3%)	0(0%)	
11-20	18(41.9%)	2(28.6%)	
21-30	10(23.3%)	1(14.3%)	
>30	2(4.7%)	0(0%)	
Platelet count			
<1.5 lakh	11(25.6%)	2(28.6%)	0.307
>1.5 lakh	32(74.4%)	5(71.4%)	

Figure 24: Association of Lab parameters according to outcome

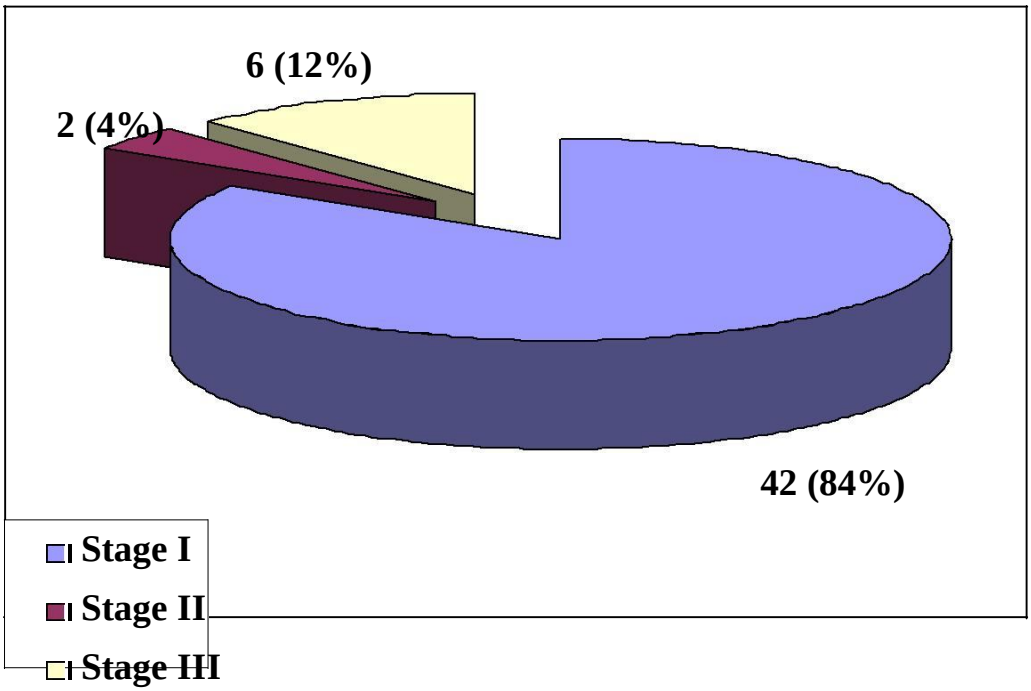


Comparison of lab parameters in good and poor outcome group shows significant p-value for PT-INR (0.020).

Table 26: Stage of AKI of patients studied

Stages of AKI	Number of patients	%
Stage I	42	84.0
Stage II	2	4.0
Stage III	6	12.0
Total	50	100.0

Figure 25: Stage of AKI of patients studied



Forty-two patients (84%) were in Stage I AKI, 2 (4%) were in Stage II and 6 (12%) patients were in Stage III AKI.

DISCUSSION

In the present study, 50 cases were selected on the basis of simple random sampling method from the OPD and medical wards Government Rajaji Hospital, who had developed snake bite induced AKI.

1. Study Period

June 2014 to October 2014

2. Age Distribution

Studies	Mean Age (Years)	SD
Present Study	43.8	12.63

The Mean age of present study population was 43±12.63 years.

3. Sex Distribution

Studies	Male	Female
Present Study	62%	38%

In the present study, males account for 62%.

4. Lapse of time in hours

Studies	No.of Patients	Percentage
Present Study	14	28%

5. **Symptoms**

Symptoms	Present Study
Reduced urine output	60%
Bleeding from bite site	32%
Bleeding from gums	18%
Signs of inflammation	98%

Signs of inflammation in the present study were 98%.

6. **Coagulation profile except platelet count**

Studies	No.of Patients	Percentage
Present Study	26	52%

Abnormal coagulation profile was observed in 52% patients.

7. **Platelet count**

Studies	No.of Patients	Percentage
Present Study	13	26%

8. Whole Blood Clotting Time (WBCT)

Studies	No.of Patients	Percentage
Present Study	35	70%

9. Significant variables

Variables	Present Study	
	Percentage	**P-Value**
Signs of inflammations	98%	1.00
Lapse of time >12 hours	28%	0.005
Mean Cr in mg/dl	3.02	<0.001
Mean B. Urea in mg/dl	81.92	<0.001

Clinical variables like signs of inflammation, lapse of time of <12 hours in presenting to the hospital, mean serum creatinine and mean blood urea elevations with significant p-value.

SUMMARY

This study is a descriptive study of 50 randomly selected patients with snake bite induced AKI. These patients were admitted to Government Rajaji Hospital, Madurai from June 2014 to October 2014.

In our study, mean age of patients studied was 43.8±12.63 years. Male to female ratio was 1.63:1 with male preponderance. The mean interval between snakebite and presentation to KR-Hospital was 15.37 hours. All snake bites were inflicted to lower limbs and 48% of snake bites were due to Viper as identified by patients.

Ninety-eight per cent of patients presented with local signs of inflammation indicating the vasculotoxic nature of envenomation. Fifty-two per cent of patients presented with coagulation abnormality and 60% with decreased urine output which were associated with increase severity of AKI and need for haemodialysis in 12% (6) of patients.

Only 26% of patients presented with thrombocytopenia which was not associated with the severity of AKI.

CONCLUSION

From our study we conclude that

- Common manifestations of poisonous snake bite include cellulitis, abnormal coagulation profile and decreased urine output.
- Overall mortality due to snake bite induced AKI is 6%.
- Lapse of time in presenting to the hospital and abnormal coagulation profile are the predictors of poor outcome in snake bite induced acute kidney injury.

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PROFORMA

Name :

:

Age /sex: date of admission :

Occupation :

Address :

A.Presenting complaints

B.History of presenting complaint

Lapse of time after the snake bite:

Type of alternative treatment before coming to hospital: Tourniquet application:

Identification of the snake: Urine output:

Hematuria:

Bleeding from the gums: Drooping of eyelids

[PTOSIS]: Loss of consciousness: Convulsions:

Difficulty in breathing: Headache:

Vomiting: Bite site: Fang mark:

Local swelling:

Associated with pain:

Bleeding from the bite site:

C. Past history

Hypertension: Yes/No

Diabetes mellitus: Yes/No

Pre-existing renal disease: Yes/No

D. Personal history

Appetite: normal/decreased

Diet: veg/mixed

Sleep: disturbed/normal

Bladder: normal

Decreased: Yes/No

Bowel habits:

Additional habits: smoking

Alcohol consumption

E. Menstrual history

Cycle: duration:

Flow: scanty/moderate/heavy

F. General physical examination

built: well/moderate/poorly

nourishment: well/ moderate/poorly

vitals: blood pressure: mmHg in right upper limb in supine position
pulse rate: bpm
regular/irregular

volume:

character: vessel wall:
All the peripheral pulses equally felt/not felt
Radioradial/radiofemoral delay: Yes/No Respiratory rate: cycles/min
Temperature:

Pallor: present/not present Icterus: Yes/No Clubbing:
Yes/No Cyanosis: Yes/No Lymphedenopathy:
Bleeding from gums: Yes/No Local examination of the bite
site: site:

skin:

fang mark:

bleeding from the site: local edema:

temperature: raised/ not raised tenderness: present/not

G. Systemic examination

Cardiovascular system:

Respiratory system:

Per abdomen:

CNS examination:

H. Investigations

1. Complete hemogram:

2. Whole blood clotting time:

3. Bleeding time:

4. Blood urea:

baseline: at 24 hours: 2nd day:

3rd day:

5. Serum creatinine: baseline:

at 24 hours: 2nd day: 3rd day:

6.Creatine kinase:

7.Prothrombin time:

8.Partial thromboplastin time:

9.USG abdomen

10. Urine output:

baseline:

at 24 hours:

2nd day:

3rd day:

11.Estimated gfr by mdrd formula:

I. Diagnosis

J. Treatment given

hemodialysis:

need for hemodialysis: Yes/No

number of cycles underwent:

after 1st cycle 2nd 3rd 4th 5th 6th 7th 8th

B. urea:

S. creatinine:

Urine output:

K. Conclusion and comment

KEY TO MASTER CHART

APTT	Activated Partial Thromboplastin Time
ASV	Anti Snake Venom
Bl. Urea	Blood Urea
CKD	Chronic Kidney Disease
eGFR	Estimated glomerular filtration rate
FFP	Fresh Frozen Plasma
IVE	Intravenous Fluid
Sr. Creatinine	Serum Creatinine
TC	Total count
WBCT	Whole Blood Clotting Time

Sl. No.	Age (years)	Sex	snake bite site	lapse of time in hrs	alternative treatment	Tornique application	Identification of snake	Reduced urine output	Hematuria	Bleeding from the gums	Vomiting	Pulse	BP		Fang mark	Signs of inflammation	Bleeding from bite site	Peripheral pulses	Hemoglobin in gms	TC	Platelet count in lakhs	WBCT in minutes	Bleeding time	Bl. Urea		
													Systolic	Diastolic										at baseline	at 24 hrs	2nd day	3rd day
1	45	M	Rt leg	2	-	+	No	+	-	-	-	86	130	80	+	+	-	+	11.0	5800	2.8	<20	N	41	67	67	36
2	45	M	Rt leg	½	-	+	No	+	-	-	-	120	90	70	+	+	-	+	8.9	21,410	1.82	>20	↑	39	34	52	88
3	45	M	Lt foot	6	-	+	Viper	N	-	-	-	88	110	80	+	+	+	+	11.8	7,600	1.71	>20	↑	20.9	31	28	-
4	26	M	Lt foot	4	-	+	Viper	+	-	+	-	84	110	80	+	+	+	+	2.5	3,600	1.2	>20	↑	31	118	98	60
5	60	M	Rt foot	12	+	+	No	+	-	-	-	94	120	80	+	+	-	+	10.5	9,100	0.51	>20	N	98	121	142	100
6	60	M	Lt leg	9	+	+	No	+	-	-	-	86	130	80	+	+	-	+	14.0	6,400	2.8	>20	N	58	55	121	74
7	42	M	Rt leg	29	-	-	Viper	+	-	-	-	-	94	60	+	+	-	+	5.0	21,700	0.27	<20	N	74	110	121	89
8	45	M	Rt foot	2	-	+	No	+	-	-	2	72	110	70	+	+	-	+	11.0	6,400	2.5	>20	N	34	52	48	45
9	55	F	Lt leg	19	-	+	No	+	-	+	2	NP	NR	NR	+	+	+	NP	7.2	4,000	2.1	<20	N	92	125	89	65
10	60	M	Lt leg	48	-	+	No	+	-	-	-	86	140	80	+	+	-	+	10.7	8,800	0.93	<20	N	43	86	67	39
11	55	M	Lt leg	4	-	+	Viper	+	-	+	-	82	114	70	+	+	+	+	10.4	4,800	2.4	>20	↑	34	72	50	53
12	65	F	Lt leg	6	-	+	No	+	-	-	-	80	124	72	+	+	-	+	10.1	7,400	1.9	>20	N	47	29	32	-
13	40	F	Lt 2 toe	1	-	+	No	N	-	-	-	88	110	80	+	+	-	+	9.3	6,800	2.8	>20	N	23	40	52	48
14	26	M	Lt leg	7	-	+	No	+	-	-	-	84	120	90	+	+	-	+	8.9	8,900	2.25	>20	N	15	48	99	96
15	30	M	Lt 1 toe	4	-	+	No	+	-	+	-	88	110	80	+	+	+	+	11.4	5800	1.63	>20	N	70	72	68	62
16	25	M	Rt 3 toe	2	-	+	No	N	-	-	-	80	118	80	+	+	+	+	11.7	31,100	1.25	>20	N	35	65	22	28
17	55	F	Lt calf	4	-	+	No	N	-	-	-	80	90	70	+	+	+	+	10.2	4,200	2.8	<20	N	50	79	26	17
18	60	M	Lt foot	24	-	+	No	+	-	-	-	90	80	50	+	+	-	+	10.0	11,000	1.7	>20	N	192	188	119	106
19	50	F	Lt shin	24	+	+	Viper	+	-	-	4	88	130	80	+	+	-	+	8.8	13,440	0.53	>20	N	22	105	98	96
20	52	F	Lt foot	4	-	+	No	N	-	-	1	90	110	60	+	+	-	+	10.8	5,900	0.57	>20	N	22	63	29	29
21	32	F	Rt foot	3	-	-	No	+	-	-	3	90	110	80	+	+	-	+	10.1	6,400	1.9	>20	N	48	52	84	60
22	50	F	Lt foot	>96	+	+	Viper	+	-	-	4	90	100	80	+	+	-	+	8.0	18,00	1.7	<20	N	198	176	135	78
23	18	M	Lt 2 toe	48	-	+	No	N	-	-	-	66	120	80	+	+	-	+	9.0	6,300	2.8	<20	N	28	35	33	29
24	60	F	Rt leg	16	-	+	Viper	+	-	-	-	100	90	50	+	+	-	+	9.8	17,600	0.3	>20	N	88	88	105	142
25	28	M	Rt foot	4	-	-	No	N	-	-	10	92	120	80	+	+	-	+	9.0	5,100	2.1	>20	N	98	102	92	25

Sl. No.	Age (years)	Sex	snake bite site	lapse of time in hrs	alternative treatment	Tornique t application	Identification of snake	Reduced urine output	Hematuria	Bleeding from the gums	Vomiting	Pulse	BP		Fang mark	Signs of inflammation	Bleeding from bite site	Peripheral pulses	Hemoglobin in gms	TC	Platelet count in lakhs	WBCT in minutes	Bleeding time	Bl. Urea		
													Systolic	Diastolic										at baseline	at 24 hrs	2nd day	3rd day
26	45	M	Rt foot	4	-	+	No	N	-	-	-	76	120	70	+	+	-	+	10.8	8,400	3.1	<20	N	34	52	48	41
27	56	F	Lt foot	6	-	-	Viper	+	-	-	2	89	118	80	+	+	-	+	10.2	6,400	2.1	>20	N	45	68	52	48
28	40	M	Rt leg	24	-	-	Viper	N	+	-	3	100	100	60	+	+	+	+	4.3	11,400	0.75	<20	↑	65	108	140	152
29	24	M	Rt foot	3	-	-	No	N	-	-	-	84	100	80	+	+	-	+	11.0	6,000	2.7	>20	N	48	52	45	34
30	35	F	Lt shin	10	-	-	Viper	+	-	+	2	102	90	60	+	+	+	+	6.0	4,600	2	>20	N	89	115	72	65
31	56	F	Lt foot	96	+	-	Viper	+	-	-	-	110	94	60	+	+	+	+	10.4	8,600	1.8	<20	N	135	162	176	155
32	28	F	Lt foot	4	-	-	Viper	+	+	+	-	92	100	70	+	+	+	+	6.0	10,400	1	>20	↑	35	48	55	48
33	26	M	Lt leg	5	-	-	Cobra	+	-	-	-	104	100	60	+	+	-	+	10.8	4,800	3.1	>20	N	36	48	33	18
34	43	F	Lt calf	4	-	+	No	N	-	-	-	110	94	60	+	+	-	+	9.8	7,400	1.9	>20	N	50	80	32	26
35	27	F	Rt leg	4	-	-	No	+	-	-	4	100	100	60	+	+	+	+	9.0	5,100	2.1	<20	N	92	102	25	28
36	60	M	Lt leg	48	-	+	Viper	+	+	-	-	88	110	80	+	+	+	+	10.0	8,000	1.1	>20	N	67	86	39	28
37	50	M	Lt leg	4	-	+	Viper	+	+	+	-	82	114	70	+	+	+	+	10.2	5,800	0.5	>20	↑	34	72	50	53
38	47	F	Lt leg	14	-	-	Viper	+	+	-	4	NP	NR	NR	+	+	+	NP	9.7	4,000	2	<20	N	92	125	89	65
39	65	M	Lt leg	6	-	-	No	N	-	-	3	92	100	74	-	+	-	+	10.2	4,600	2.7	>20	N	35	47	29	29
40	40	F	Lt foot	1	-	-	Viper	N	-	-	-	88	116	70	+	+	-	+	9.3	10,400	3.1	>20	N	23	40	45	38
41	36	M	Lt leg	7	-	+	Viper	N	-	-	-	84	120	90	+	+	-	+	8.9	8,900	2.3	>20	N	25	48	99	96
42	55	M	Lt leg	8	+	+	Viper	+	+	+	2	84	130	80	+	+	-	+	7.4	5,800	1.6	>20	↑	70	72	80	78
43	47	M	Rt foot	24	+	+	Viper	+	-	-	5	100	80	50	-	+	-	+	9.8	6,400	2.7	<20	N	119	192	188	160
44	26	M	Rt foot	3	-	-	Viper	N	-	-	-	80	100	70	+	+	-	+	11.7	11,100	1.25	>20	N	22	35	68	42
45	50	M	Lt calf	4	-	-	Viper	N	-	-	2	90	90	70	+	+	+	+	7.2	4,200	2.2	>20	N	50	79	36	17
46	48	M	Rt calf	6	-	+	No	N	-	-	-	76	130	80	+	+	+	+	12.2	6,800	3.2	>20	N	68	72	90	84
47	35	M	Lt foot	3	-	+	No	N	-	-	-	100	124	74	+	+	-	+	9.0	6,300	2.7	>20	N	40	52	68	62
48	50	M	Rt 2 toe	2	-	-	Viper	N	-	-	2	100	90	70	+	+	-	+	10.2	4,200	2.7	<20	N	79	84	62	56
49	42	F	Lt leg	>96	+	-	Viper	+	+	-	10	92	90	60	+	+	-	+	6.8	4,600	3.2	<20	N	105	142	180	196
50	30	F	Rt foot	4	-	-	No	N	-	-	10	92	104	64	-	-	-	+	9.0	5,100	2.6	>20	N	92	102	35	28

Sl. No.	Sr. Creatinine			Creatine kinase	PT-INR	APTT	USG Abdomen	Urine output in ml			eGFR	ASV vials given	Supportive tretment					Need for hemodialysis	After 1st cycle			At the end			End Result
	at baseline	at 24hrs	2nd day	3rd day				at baseline	at 24hrs	2nd day	3rd day		IVF	Antibiotics	FFP	Platelets	Whole blood		no. of cycles	Blood urea	Serum creatinine	Urine output	Blood urea	Serum creatinine	Urine output	
1	1.7	1.2	1.8	1	200	1.0	40	N	950	1500	1700	2700	70	12	+	+	-	-	-	-	-	-	-	-	-	-	Improved
2	0.3	0.9	1.7	1.3	180	1.3	43	N	800	800	1200	1600	92	20	+	+	-	-	-	-	-	-	-	-	-	-	Improved
3	0.9	1.4	0.8	-	345	1.0	12	N	1000	1500	2000	2000	58	20	+	+	2	-	-	-	-	-	-	-	-	-	Improved
4	1.2	2.9	1.8	1.4	320	1.0	4	N	200	900	2000	2500	28	25	+	+	-	-	3	-	-	-	-	-	-	-	Improved
5	4.4	5.3	7.8	5.2	400	1.0	44	N	600	800	1000	1000	12	30	+	+	-	-	-	-	-	-	-	-	-	-	CKD
6	1.2	2.0	3.1	2.5	250	1.0	45	N	800	1000	1000	2000	36	48	+	+	-	-	-	-	-	-	-	-	-	-	Improved
7	4.6	6.0	6.5	6.2	498	1.7	40	MRD	Nil	Nil	60	100	11	40	+	+	-	-	-	+	6	121	6.5	Nil	55	2.8	1000	Improved
8	0.9	1.4	1.8	1.3	160	1.0	30	N	800	1000	1500	2000	58	25	+	+	-	-	-	-	-	-	-	-	-	-	-	Improved
9	1.2	1.7	1	1.1	320	1.6	30	N	15	1200	2200	2500	32	30	+	+	-	-	-	-	-	-	-	-	-	-	Improved
10	2.0	2.4	1.6	1.3	128	1.2	48	N	1000	1500	2000	2000	31	-	+	+	-	4	-	-	-	-	-	-	-	-	Improved
11	1.2	1.5	0.8	0.7	200	0.9	22	N	800	1000	1500	2000	52	30	+	+	-	-	-	-	-	-	-	-	-	-	Improved
12	0.7	1.1	1.4	1.2	240	1	26	N	800	800	1000	1500	48	19	+	+	-	-	-	-	-	-	-	-	-	-	Improved
13	0.7	1.4	1.3	1.2	180	1	20	N	2000	2500	2500	2500	56	11	+	+	-	-	-	-	-	-	-	-	-	-	Improved
14	1.1	1.6	2.5	2.1	188	1	28	MRD	600	1000	1500	2000	55	20	+	+	-	-	-	-	-	-	-	-	-	-	Improved
15	1.5	2.1	1.4	1	128	3.1	120	N	800	1000	1250	2000	40	30	+	+	-	-	-	-	-	-	-	-	-	-	Improved
16	1.3	1.6	1	0.8	200	1	22	N	4000	3500	3000	3500	55	5	+	+	-	-	-	-	-	-	-	-	-	-	Improved
17	0.8	1.2	0.6	0.6	178	1	28	N	2000	2500	2500	2000	47	-	+	+	-	-	-	-	-	-	-	-	-	-	Improved
18	6.9	9.5	6.7	5.4	498		44	MRD	100	100	500	800	6	20	+	+	-	-	-	-	-	-	-	-	-	-	CKD
19	1.6	4.8	4.2	2.1	168	1	32	N	500	1000	1500	2000	10	15	+	+	-	-	-	-	-	-	-	-	-	-	Improved
20	1.1	1.6	0.9	0.9	164	1	29	N	1500	2000	2000	2000	36	20	+	+	-	-	-	-	-	-	-	-	-	-	Improved

21	0.8	1.4	1.8	1.5	188	1	40	N	750	1000	1500	2000	46	20	+																Improved
22	20.0	21.0	14	12	560	1.5	40	MRD	100	100	500	500	2	-	+	+	-	-	-	-	2	+	4	135	14	500	-	-	-	-	Death
23	0.5	0.9	0.8	0.6	118	1	29	N	3000	2800	3000	3000	11 7	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Improved
24	3.4	5.0	4.5	3.8	450	1.5	34	MRD	400	800	1200	2000	9	25	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Improved
25	2.0	2.8	2.6	1.2	178	1	29	MRD	2500	2800	3000	3000	28	15	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Improved

Sl. No.	Sr. Creatinine				Creatine kinase	PT-INR	APTT	USG Abdomen	Urine output in ml			eGFR	ASV vials given	Supportive tretment				Need for hemodialysis	After 1st cycle			At the end		End Result
	at baseline	at 24hrs	2nd day	3rd day					at baseline	at 24hrs	2nd day	3rd day		IVF	Antibiotics	FFP	Platelets	Whole blood	no. of cycles	Blood urea	Serum creatinine	Urine output	Blood urea	Serum creatinine	Urine output	
26	0.9	1.4	1.3	1	110	1	30	N	2500	2000	3000	2500	66	-	+	-	-	-	-	-	-	-	-	-	-	Improved
27	1.8	2.3	2.1	1.9	168	1	29	N	600	1000	1500	1500	23	25	+	+	-	-	-	-	-	-	-	-	-	Improved
28	4.2	5.8	7.2	7	333	1.5	44	MRD	50	50	100	150	12	20	+	+	-	-	2	+	3	140	7.2	100	-	-	-	Death
29	1.4	1.8	1.3	0.9	172	1	29	N	3000	2500	2500	2500	50	10	+	+	-	-	-	-	-	-	-	-	-	-	-	Improved
30	1.2	1.7	1.1	1.2	310	1	29	N	100	800	2000	2500	36	10	+	+	-	-	-	-	-	-	-	-	-	-	-	Improved
31	12.4	14.2	21	18	424	1	32	MRD	100	150	150	100	3	-	+	-	-	-	+	1	155	18.0	150	-	-	-	-	Death
32	0.9	1.4	1.5	1.3	289	3	50	MRD	500	500	600	1000	48	20	+	4	-	2	-	-	-	-	-	-	-	-	-	Improved
33	1	1.5	1.3	1.1	164	1	30	N	900	900	1000	1500	60	20	+	-	-	-	-	-	-	-	-	-	-	-	-	Improved
34	0.8	1.2	0.6	0.6	192	1	29	N	2000	2000	2500	3000	52	10	+	-	-	-	-	-	-	-	-	-	-	-	-	Improved
35	2.5	2.8	1.2	1.2	132	1	32	MRD	500	600	1000	1500	21	-	+	+	-	-	-	-	-	-	-	-	-	-	-	Improved
36	1.5	2.2	1.3	1.4	258	1.2	48	MRD	800	1000	2000	2500	33	-	+	-	-	-	-	-	-	-	-	-	-	-	-	Improved
37	1.2	1.6	0.8	0.7	228	1.1	38	N	1000	1500	2500	2500	49	20	+	-	-	-	-	-	-	-	-	-	-	-	-	Improved
38	1.3	1.7	1.5	1	320	1.6	32	MRD	50	300	1200	2200	33	30	+	-	-	-	-	-	-	-	-	-	-	-	-	Improved
39	1	1.4	1.2	1.2	162	1	29	N	1000	1500	2000	2200	54	15	+	-	-	-	-	-	-	-	-	-	-	-	-	Improved
40	0.7	1.2	1.4	1	218	1	31	N	2000	2500	2000	2500	53	11	+	-	-	-	-	-	-	-	-	-	-	-	-	Improved
41	1.1	1.6	2.5	2.2	340	1.5	40	MRD	2000	2000	2500	2500	51	25	+	-	-	-	-	-	-	-	-	-	-	-	-	Improved
42	1.5	2.1	2.3	1.9	218	3.1	90	MRD	800	1000	1250	2000	35	30	+	4	-	-	-	-	-	-	-	-	-	-	-	Improved
43	6.7	6.9	9.5	8.2	336	1.3	32	MRD	100	100	100	100	9	-	+	-	-	-	+	8	188	9.5	100	1325.9	800	CKD		
44	1	1.2	1.6	1.4	198	1.2	29	N	3000	3500	3000	3000	78	5	+	-	-	-	-	-	-	-	-	-	-	-	-	Improved
45	0.8	1.3	0.6	0.6	298	1	32	N	2000	2500	3000	3000	62	10	+	-	-	-	-	-	-	-	-	-	-	-	-	Improved

46	1.1	1.2	1.6	2.1	360	1	34	N	2500	2500	3000	3000	69	20	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Improved
47	0.7	1.1	1.4	1.3	362	1	36	N	2500	3000	3000	2500	81	10	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Improved
48	1.2	1.6	1.3	0.8	340	1	36	N	2500	2500	3000	3000	49	20	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Improved
49	4.8	6.2	6.8	7.2	668	1.5	40	MRD	50	50	100	100	8	-	+	+	-	-	-	+	7	180	6.8	160	140	5.8	1000	CKD		
50	2.4	2.9	2.6	1.9	290	1.2	34	MRD	2500	2500	3000. 0	2500	20	20	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Improved

Ref.No.8102/E1/5/2014

Madurai Medical College,
Maduai -20. Dated: 24.09.2014.

Institutional Review Board/Independent Ethics Committee
Capt.Dr.B.Santhakumar,MD (FM). deanmdu@gmail.com
Dean, Madurai Medical College &
Government Rajaji Hospital, Madurai 625 020 . Convenor

Sub: Establishment – Madurai Medical College, Madurai-20 –
Ethics Committee Meeting – Meeting Minutes - for September 2014 –
Approved list – reg.

The Ethics Committee meeting of the Madurai Medical College, Madurai was held on September 12th 2014 at 10.00 Am to 12.00 Noon at Anaesthesia Seminar Hall at Govt. Rajaji Hospital, Madurai . The following members of the Ethics Committee have attended the meeting.

1.Dr.V.Nagarajan,M.D.,D.M(Neuro) Ph: 0452-2629629 Cell No.9843052029 nag9999@gmail.com.	Professor of Neurology (Retired) D.No.72, Vakkil New Street, Simmakkal, Madurai -1	Chairman
2.Dr.Mohan Prasad, MS.M.Ch. Cell.No.9843050822 (Oncology) drbkcmp@gmail.com	Professor & H.O.D of Surgical Oncology (Retired) D.No.32, West Avani Moola Street, Madurai.-1	Member Secretary
3. Dr.L.Santhanalakshmi, MD (Physiology) Cell No.9842593412 dr.l.santhanalakshmi@gmail.com.	Vice Principal, Prof. & H.O.D. Institute of Physiology Madurai Medical College	Member
4.Dr.K.Parameswari, MD(Pharmacology) Cell No.9994026056 drparameswari@yahoo.com.	Director of Pharmacology Madurai Medical College.	Member
5.Dr.S.Vadivel Murugan, MD., (Gen.Medicine) Cell No.9566543048 svadivelmurugan_2007@rediffmail.com.	Professor & H.O.D of Medicine Madurai Medical College	Member
6.Dr.A.Sankaramahalingam, MS., (Gen. Surgery) Cell.No.9443367312 chandrahospitalmdu@gmail.com	Professor & H.O.D. Surgery Madurai Medical College.	Member
7.Mrs.Mercy Immaculate Rubalatha, M.A., Med., Cell.No.9367792650 lathadevadoss86@gmail.com	50/5, Corporation Officer's Quarters, Gandhi Museum Road, Thamukam, Madurai-20.	Member
8.Thiru.Pala.Ramasamy, B.A.,B.L., Cell.No.9842165127 palaramasamy2011@gmail.com	Advocate, D.No.72,Palam Station Road, Sellur, Madurai-20.	Member
9.Thiru.P.K.M.Chelliah, B.A., Cell No.9894349599 pkmandco@gmail.com	Businessman, 21 Jawahar Street, Gandhi Nagar, Madurai-20.	Member

The following Project was approved by the Ethical Committee

Name of P.G.	Course	Name of the Project	Remarks
Dr.S.Selvaraj drselva92@gmail.com	PG in MD (General Medicine) Madurai Medical College and Govt. Rajaji Hospital, Madurai.	**Acute kidney injury in snake bite patients and its clinical predictors.**	**Approved**

Please note that the investigator should adhere the following: She/He should get a detailed informed consent from the patients/participants and maintain it Confidentially.

1. She/He should carry out the work without detrimental to regular activities as well as without extra expenditure to the institution or to Government.
2. She/He should inform the institution Ethical Committee, in case of any change of study procedure, site and investigation or guide.
3. She/He should not deviate the area of the work for which applied for Ethical clearance. She/He should inform the IEC immediately, in case of any adverse events or Serious adverse reactions.
4. She/He should abide to the rules and regulations of the institution.
5. She/He should complete the work within the specific period and if any Extension of time is required He/She should apply for permission again and do the work.
6. She/He should submit the summary of the work to the Ethical Committee on Completion of the work.
7. She/He should not claim any funds from the institution while doing the work or on completion.
8. She/He should understand that the members of IEC have the right to monitor the work with prior intimation.

Member Secretary
Ethical Committee

Chairman
Ethical Committee

24.9.14

DEAN/Convenor
Madurai Medical College &
Govt. Rajaji Hospital, Madurai.

To
The above Applicant
-thro. Head of the Department concerned

D.S.
24/9/14

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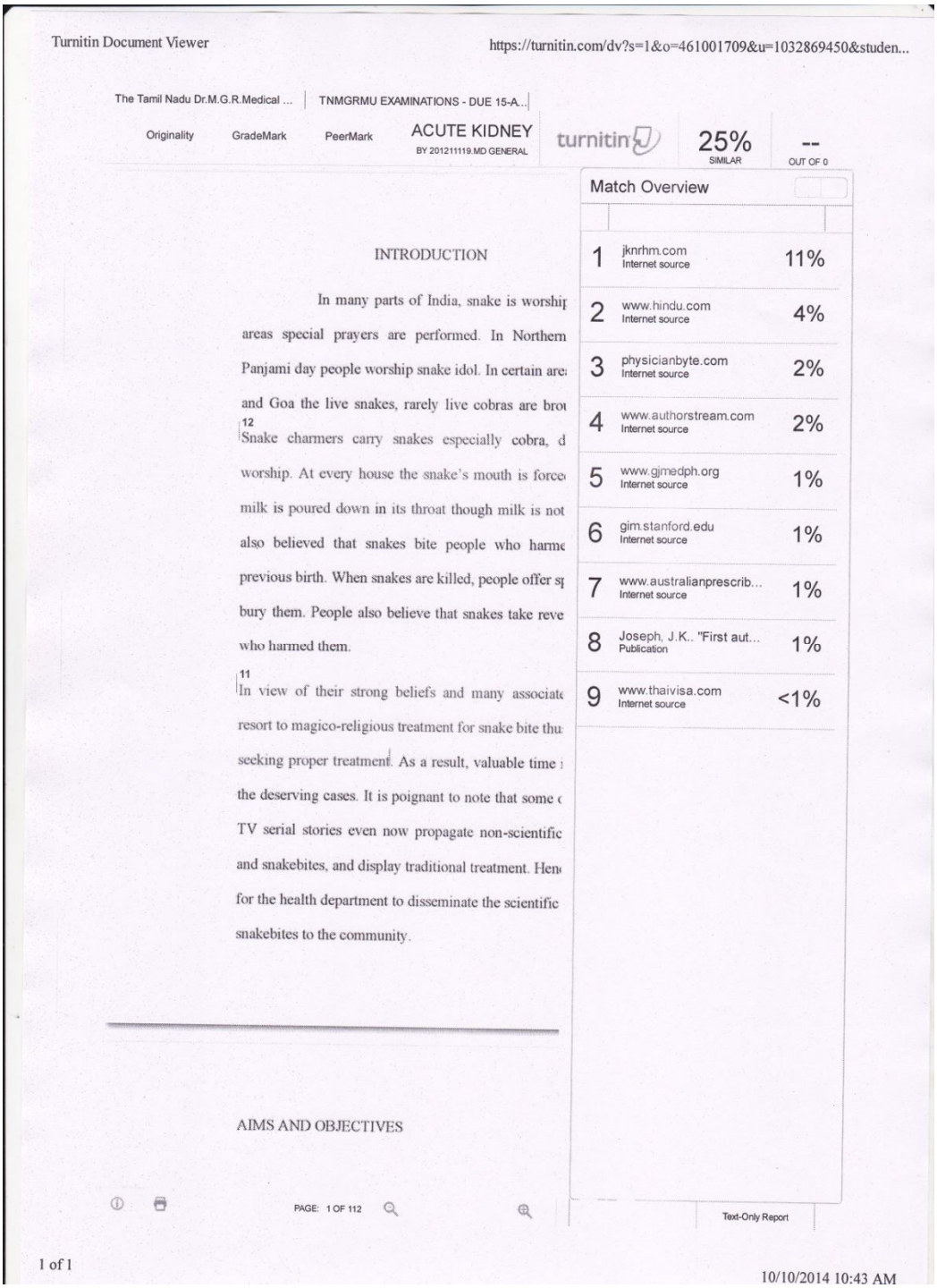
INTRODUCTION

In many parts of India, snake is worshipped and in some areas special prayers are performed. In Northern India on Naga Panjami day people worship snake idol. In certain areas of Maharashtra and Goa the live snakes, rarely live cobras are brought for worship. Snake charmers carry snakes especially cobra, door to door for worship. At every house the snake's mouth is forced open and some milk is poured down in its throat though milk is not snake food. It is also believed that snakes bite people who harmed them in their previous birth. When snakes are killed, people offer special prayers and bury them. People also believe that snakes take revenge against those who harmed them.

In view of their strong beliefs and many associated myths, people resort to magico-religious treatment for snake bite thus causing delay in seeking proper treatment. As a result, valuable time is lost in some of the deserving cases. It is poignant to note that some of the cinema and TV serial stories even now propagate non-scientific ideas on snakes and snakebites, and display traditional treatment. Hence, there is a need for the health department to disseminate the scientific aspects related to snakebites to the community.



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INTRODUCTION

In many parts of India, snake is worshi areas special prayers are performed. In Northern Panjami day people worship snake idol. In certain are and Goa the live snakes, rarely live cobras are bro 12 Snake charmers carry snakes especially cobra, d worship. At every house the snake's mouth is force milk is poured down in its throat though milk is not also believed that snakes bite people who harme previous birth. When snakes are killed, people offer s bury them. People also believe that snakes take reve who harmed them.

11 In view of their strong beliefs and many associate resort to magico-religious treatment for snake bite thu seeking proper treatment. As a result, valuable time the deserving cases. It is poignant to note that some TV serial stories even now propagate non-scientific and snakebites, and display traditional treatment. Hen for the health department to disseminate the scientific snakebites to the community.

AIMS AND OBJECTIVES

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